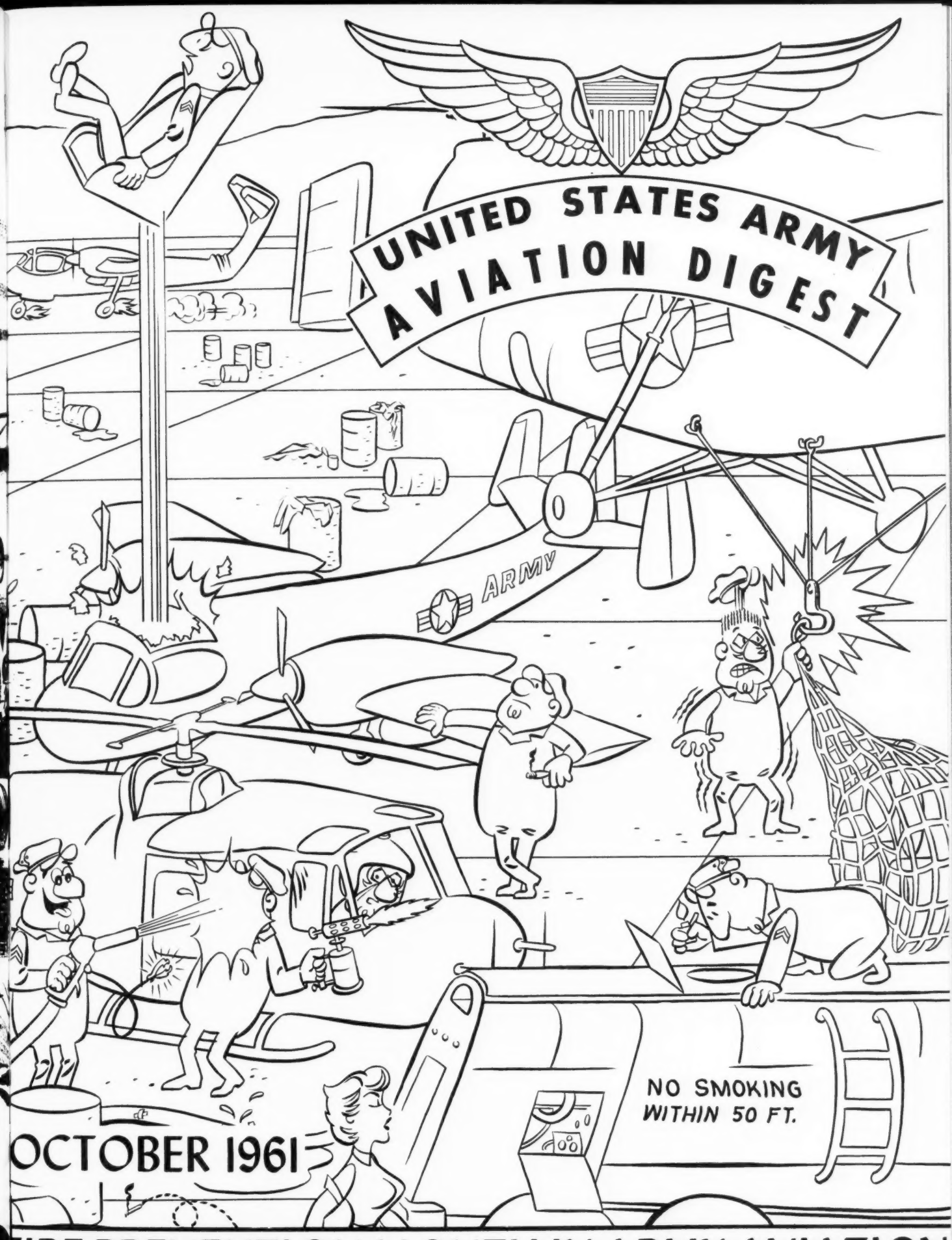

OCTOBER 1961

FIRE PREVENTION MONTH IN ARMY AVIATION

United States Army

AVIATION DIGEST

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Write and Win $125.00 Cash

The U. S. ARMY AVIATION DIGEST is sponsoring an Annual Writing Awards Contest to encourage people interested in the Army Aviation Program to present their ideas or experiences on safety and aircraft accident prevention, training, maintenance, operations, research and development, aviation medicine and other related data. While you shouldn't identify actual people, accidents or incidents, it is permissible to use accidents/incidents as a basis for material. Be factual and be sure all material is unclassified.

It's E-A-S-Y! Just write what you think should or could be done to help accomplish our mission easier, quicker, more effectively. Contest is open to anyone, but we want original material that has not been published or submitted for publication. Articles should be approximately 1,500-2,000 words in length (about 5-6 double-spaced typewritten pages). Entries will not be judged on length, typing, or neatness however. Only published articles are eligible for the CASH awards.

The contest started with the July 1961 issue and closes with the June 1962 issue. You have three chances to win CASH! First prize $125, second prize $75, and third prize $50. A winner will be announced each month. From the 12 monthly winners the judges will select the three winners of the CASH prizes.

Manuscripts will be judged on accuracy, completeness, originality, readability, reader appeal, soundness, substance, and overall merit.

Complete contest rules appeared on back cover of the May 1961 DIGEST. Send inquiries and entries to Editor-in-Chief, U. S. ARMY AVIATION DIGEST, U. S. Army Aviation School, Fort Rucker, Ala.

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The U. S. ARMY AVIATION DIGEST is an official publication of the Department of the Army published monthly under the supervision of the Commandant, U. S. Army Aviation School.

The mission of the U. S. ARMY AVIATION DIGEST is to provide information of an operational or functional nature concerning safety and aircraft accident prevention, training, maintenance, operations, research and development, aviation medicine and other related data.

Manuscripts, photographs, and other illustrations pertaining to the above subjects of interest to personnel concerned with Army Aviation are invited. Direct communication is authorized to: Editor-in-Chief U. S. ARMY AVIATION DIGEST, U. S. Army Aviation School, Fort Rucker, Alabama.

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Command Safety

Expert leadership

WITHOUT EXPERT LEADERSHIP, bowl-bound football teams fall apart and symphony orchestras sound like a boilermaker's nightmare. Any time two or more people team up to perform a task, regardless of how simple, some one person of the group must assume command and direct the talents and efforts of the others if the task is to be accomplished in the most efficient manner. With this command go certain rewards. But command is a two-edged sword; when a leader accepts rewards of prestige and rank, he must also accept responsibility for the success or failure of his group.

Army Aviation, a complicated, often hazardous, and always difficult operation run by trained and intelligent men, requires thorough supervision to a point far beyond football teams and symphony orchestras. This is not a revolutionary concept. Every commander knows that supervision is one of his major functions. Every mature aviator has learned that those units which have the fewest accidents invariably have commanders who are aware of the importance of a supervision program and know how to make it work. Under these circumstances, you'd think Army Aviation should sail smoothly along in its mission, unmolested by accidents which sap its strength and undermine its efficiency.

The fact is that 373 Army aircraft accidents during the period 1 July 1957—30 April 1961 involved **supervisory cause factors.** These accidents accounted for a hardware loss of several million dollars. It follows that there must have been a breakdown in the supervisory function somewhere.

Prepared by the United States Army Board for Aviation Accident Research.

Perhaps all of us, commanders and aviators alike, need to take a hard look at this idea of supervision.

Proper supervision is a relentless task, neither automatic nor easy. Like most other things in the Army, it involves a careful balance between the exercise of responsibility and controlled delegation of authority, a team effort instead of a one-man show.

The commander who conscientiously attempts to devise a well rounded supervision program discovers that his planning must include:

- aviators,
- discipline,
- education and training,
- maintenance and facilities.

These are as dependent on one another as is a team of circus tumblers erecting a human pyramid. When one part of the structure is weak, the whole thing can collapse abruptly.

AVIATORS

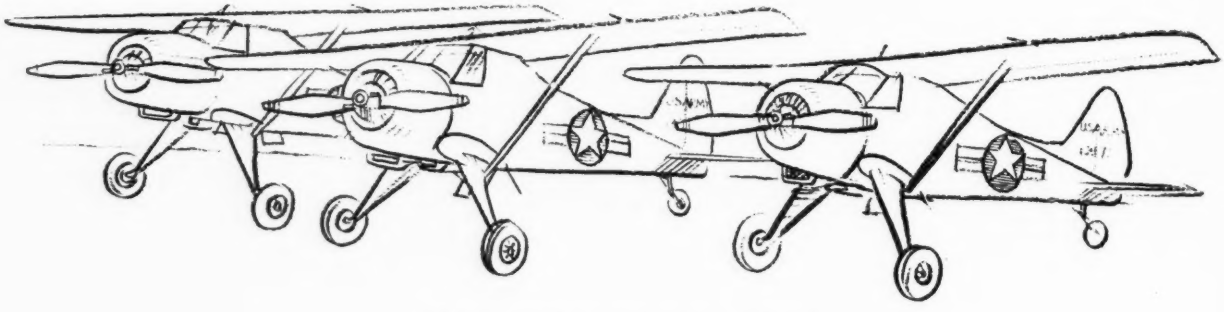
First, aviators are human and the human element in any situation is invariably the trickiest to handle. One L-20 is much like every other L-20. Any machine has an assigned function, known limits of performance, and lives up to expectations if there is fuel in the tank and the man at the controls knows what he's doing.

No two aviators are **ever** the same. Those in any unit will differ considerably in age, experience, disposition, capabilities, bank account level, and all the other variables which make each human an individual in his own right. Each demands the treatment best suited for his special needs.

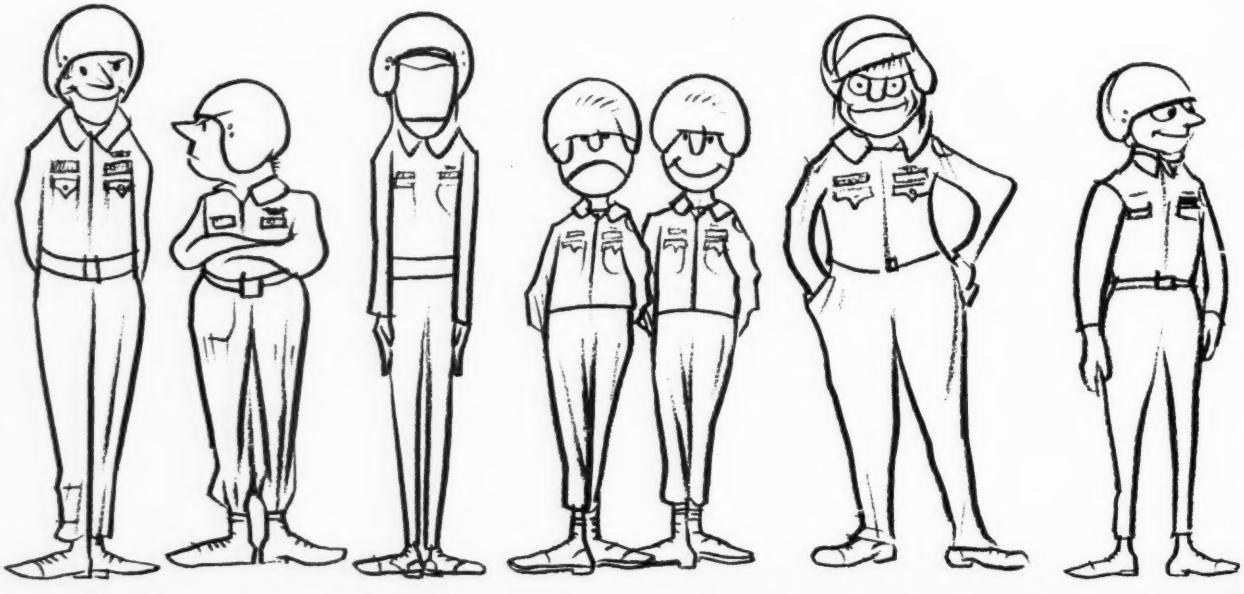
The Army commander is not supposed to be a combination master psychologist, flight surgeon and chaplain, able to probe into his aviators' psychological and physiological ills. Knowing an aviator does not mean the supervisor need be up on the date of his birthday, rating as a bridge player, and the way he likes his eggs in the morning. The commander with a planned supervision program is able instead, at any time, to make a fair assessment of his aviators' experience, capabilities, training progress, and general state of well being — the combined qualities which enable any aviator to do his job properly, regardless of how he likes his eggs.

The commander who wants

One L-20 is much like another



No two aviators are ever the same



to know his aviators doesn't have to prowl around like a super spy. He can determine the state of his men's abilities without peering over their shoulders or hiding behind doors. Sustained, friendly interest is all that is needed. One of the commander's principal allies here can be the flight surgeon. Where the flight surgeon has been freed for his assigned task of providing medical supervision for aviators, they are less likely to fly excessive hours or exceed safe physical limits. Working together, the commander and surgeon know and spot aviators who, for emotional or physical reasons, should be taken out of the game and put on the bench for a brief rest.

No matter how he gets his information, a supervision-conscious commander's mental file on an aviator adds to a thorough evaluation of what he **can** do and what he is **likely** to do. These are not always the same. The commander who knows his man thoroughly can impress on him full responsibilities and a mature self-appraisal of his abilities to perform any particular task.

Young men are naturally not only impressed by authority but eager to please, a combination which can lead them into places where they have no business. Not long ago a young lieutenant took off in a helicopter with a nonrated commander, even though visibility in spots along the intended flight route was as low as 50 feet. The aircraft flew into a powerline, killing the two occupants. The pilot had never developed a mature approach to his profession because he had not been given benefit of an adequately planned and well supervised training program. No one fresh out of any school — aviation, medical or what have you—is either a finished product or has had time to acquire a mature, balanced attitude about his work. Most experience comes from training. The commander who exercises good supervision keeps his aviators in training **all the time.**

DISCIPLINE

Maj Gen Joseph D. "Smokey" Caldara, former USAF Deputy Inspector General for Safety and one of the most well-known figures in the field of aviation safety, wrote in the January 1960 issue of FLYING SAFETY:

"Safety as it applies to the flying business is like a seamless web. It doesn't stop anywhere. However, it is diligent supervision that makes safety principles work, else they become just idle concepts and hollow catch phrases. Supervision for safety goes into the servicing of our complex aircraft, the activities of the support area, the handling of missiles and nuclear weapons, in short, into every corner of our world-wide flying operations. There simply isn't time or space to discuss them all. But I want to discuss discipline.

"It is discipline that gives structure and strength to all our efforts; without discipline, our problems are compounded and our best efforts can never succeed. Let me quote from an article by Brig Gen Seth J. McKee, written for SAC's COMBAT CREW magazine. It is titled 'Discipline, The Watchword For Safety,' and says, in part:

" 'To accomplish our mission,' — he's talking about the SAC mission — 'we must have safety, and to obtain it we must indoctrinate and reindoctrinate our people, old timers and newcomers alike, in the basic philosophy of discipline. The lack of discipline has many manifestations — sloppy preflighting, poor record keeping and flight planning, inadequate crew briefing, incomplete and illegible flight forms, hurried postflight inspections and write-ups, poor communication techniques, improper inflight crew coordination and control, needless and unnecessary weather penetrations, failure to read safety digests and other publications — all are evidence of a poor state of discipline.'

"And gentlemen, never were words put together better to describe what I'm talking about in discipline. Education, training and the judicious application of discipline are the most effective tools the commander has for the prevention of accidents. Now notice that I did not include directives among those tools. No one can prevent an accident by directive, although many have tried and some are still trying. Years ago when I was a pursuit pilot, we had had four midair collisions in three days at my field. Our commander came out with an order that there would be no more midair collisions at that field. Did this directive prevent any further midair accidents? We had two the next day.

"My old commander was just using the wrong methods because the commander is in a position to know more about safety than any person within the organization. At any level the commander sets the pace for aircraft accident prevention, missile, nuclear, or ground safety. Not that he is the safe-

ty officer — Heaven forbid! When I bump into a chap who says to me, 'Smokey, I'm the Number One fly safe officer in the organization,' I get my prayer wheel and start to spin it, because no commander has the time to perform that job.

"Our accidents rarely result from some great, dramatic catastrophe, but from a series of piddling coincidences that snowball to disastrous proportions. It's a case of getting nibbled to death by ducks. You're not being bitten in half by an alligator and you've got to think in those terms. Take the time to kick the ducks away. That's what flying safety officers should be used for by the commanders. I recommend it strongly."

EDUCATION AND TRAINING

Boxing champions who train on a diet of chocolate malteds, schooners of beer, and nightclubs may get by for a little while. But if they don't want their ears beaten off, they hire a trainer with a program designed to work off blubber, adjust timing and put the snap back in a left hook. Aviation units become as flabby as dissipated prize fighters if they lack sustained and carefully supervised training programs of their own. Modern aviation units require planned training programs to prepare aviators for their tasks, and enable them to spot situations they are not yet ready to handle. No aviator can ever be **fully** experienced, and the younger he is, the more there is to learn about his trade. Unless your man realizes this and is helped by wise supervision and training in the early stages, he may attempt a hurdle which looks easy to him, but is in reality as tough as they come.

A commander setting up a training program should study it from the standpoint of unit discipline, the nature of operations, the need to keep experienced aviators in shape, and the necessity for steering the healthy enthusiasm of younger aviators in the 200-500-hour class into proper channels. He must eliminate all guesswork and custom fit his training program to the needs of his unit. He must monitor the training program to the extent that he keeps himself informed on **what** the program is designed to accomplish, **how** its prescribed goals will be reached, and what **daily** and **weekly progress** is being made.

The good commander has a flexible training program, designed to meet the changing conditions his aviators face from one month to another. Whatever the task, the commander can be confident if he has planned carefully, delegated his authority responsibly, and is in constant touch with what is going on.

MAINTENANCE AND FACILITIES

Aviators can be honed to razor-edge sharpness by training and discipline, but performance will still suffer if maintenance of aircraft and facilities fails to meet required standards. Army commanders know this; they are solidly opposed to sand in fuel tanks, upside-down replacement parts, and holes in the runway. But maintenance is as big a job as flying. A systematic supervision program makes it considerably less trying and far more effective.

An aviation safety officer can become a strong right arm and a joy to have around when it comes to preserving high standards of maintenance and facilities. An aviation safety officer with a systematic and persistent program can alert

Temporary facilities change complexion overnight

the unit's personnel and eliminate the dozens of nagging, nasty details which arise regularly.

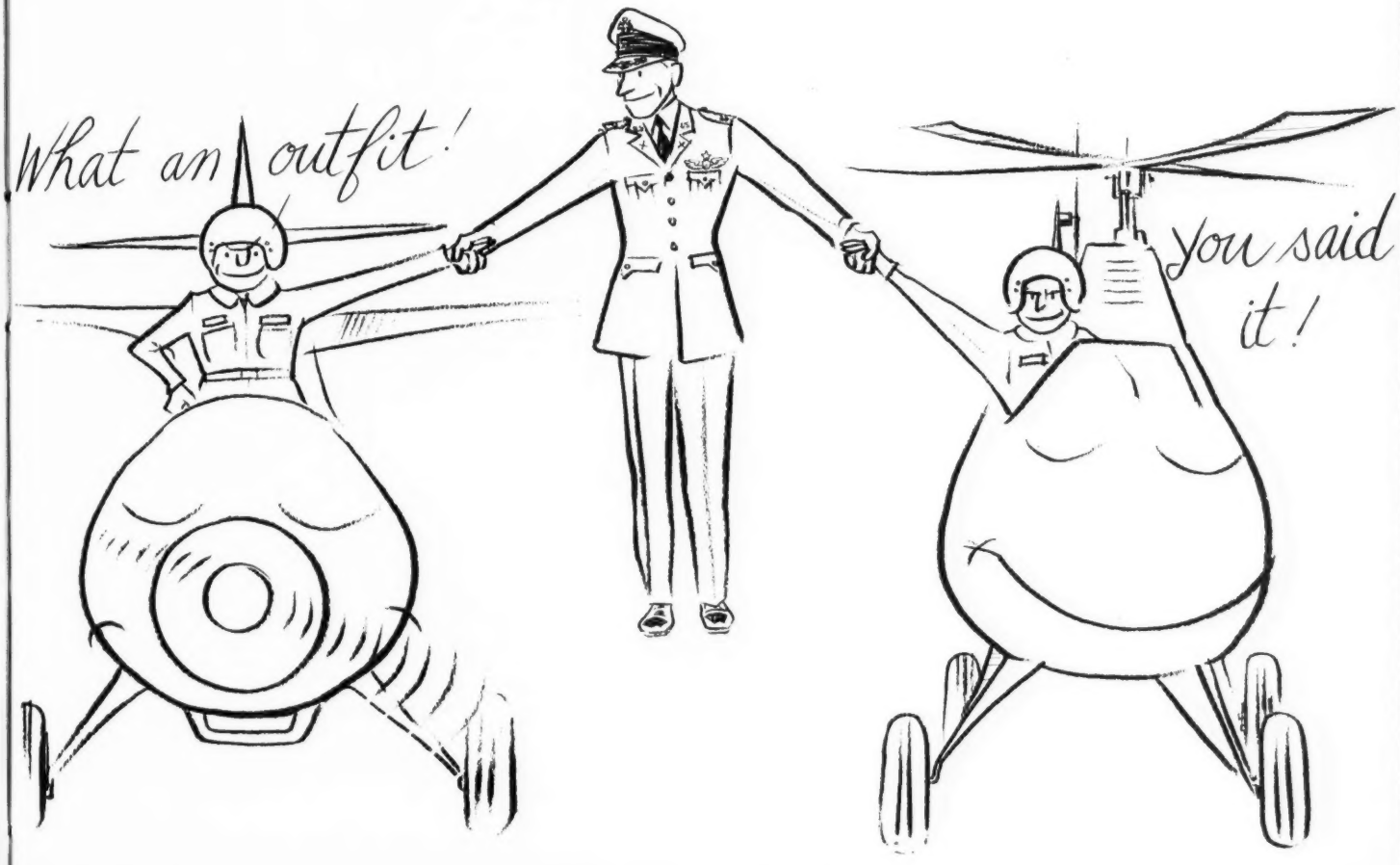
Facilities become particularly important when units are operating in the field, in rugged conditions, and from hastily set up strips or pads. Permanent installations are generally kept free of wandering animals, vegetation, and sink holes. But in the field, anything can happen and **will** happen unless steps are taken to prevent it. A temporary facility changes complexion overnight. One helicopter unit discovered this last year when it returned to a temporary facility it had used some time before. They had left the place clean and serviceable, but while they were away rain and a hot southern sun sped the growth of weeds and vines. A helicopter pilot, attempting to take off, caught his skid under a tough vine. The aircraft struggled vainly to get airborne, then flopped back with its blades beating the ground.

This accident emphasized something every good supervision program takes into account — **the tougher the situation, the closer the supervision.** Any Army Aviator, even the one who hasn't yet had his last mail forwarded from Rucker, has enough training, knowledge, and sense of responsibility to do a job under normal circumstances. Put the same aviator in the field, in a tactical situation, and it's a different story. The unit out in the field, using temporary facilities and assigned an exacting mission, is usually in a situation at least some of its pilots haven't run into before. Even old pros feel the strain. Only the commander with a well rounded supervision program can face rugged field conditions with confidence.

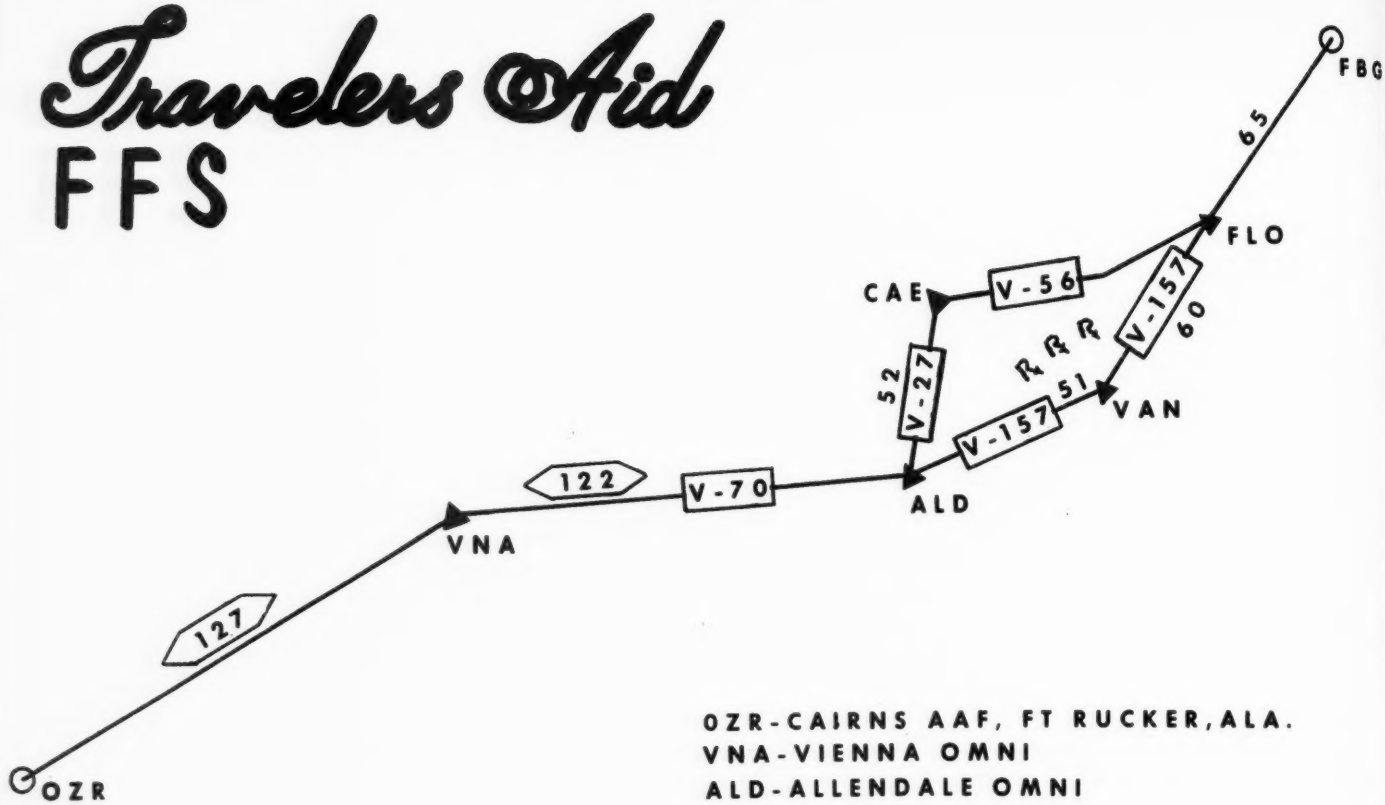
PREVENTIVE SUPERVISION

An effective supervision program contains preventive supervision. This is a well organized, aggressive program covering training, operations, facilities, maintenance, and aviators' physical and emotional well being. Put another way, a unit's accident rate is a fair index of its understanding of the value of preventive supervision. The unit polished to a high gloss by preventive supervision is disciplined, effective, and proud. Its accidents will be few and far between. □

Disciplined — effective — proud



Travelers Aid FFS



OZR-CAIRNS AAF, FT RUCKER, ALA.
VNA-VIENNA OMNI
ALD-ALLENDALE OMNI
VAN-VANCE OMNI
FLO-FLORENCE OMNI
CAE-COLUMBIA OMNI
FBG-SIMMONS AAF, FT BRAGG, N. C.

(NOT DRAWN TO SCALE)

Lieutenant Thomas R. Curtin, Armor

WITH THE DEMISE of Military Flight Service, the Federal Aviation Agency, along with their Flight Service Stations, has become more important to the military aviator. To make flight planning and VFR flying somewhat easier, the FAA recently announced a new service, Flight Following. (See "Four Lane Skyways," May '61 DIGEST.)

Military aviators are encouraged to use Flight Following when flying under visual flight rules. In using this service various points along the route of flight are designated before takeoff as flight following stations; and they are notified in advance of the flight. As the aviator progresses toward his destination, he contacts these flight watch stations, which are expecting his call. They will have a flight condition message prepared for briefing the aviator on weather existing along his route of flight and at destination.

To understand fully the use of VFR flight following service, we will plan a flight from Cairns AAF, Fort Rucker, Ala., to Simmons AAF, Fort Bragg, N. C.

In the planning room at Cairns AAF, we overhear the following conversation between Lt Jack Lincoln and Lt George Adams.

"I think we might as well

Lt Curtin is an instructor in the Academic and Synthetic Trainer Division, Dept of Adv F/W Tng, USAAVNS. He is fixed wing rated and instrument qualified.

use flight following, don't you, George?" questions Jack.

"I guess so," answers George. "But I don't know anything about it. I've never used it and I hear it is a lot of trouble. Anyway our flight should be VFR all the way; it's clear as a bell here."

"I realize it's clear here, George; but you never know what we might encounter en route. I'll explain how easy it works."

"Well, if it isn't going to be very much trouble and you think it may do some good, we might as well use it."

"No trouble at all," says Jack. "Here is how it works. Planning the flight VFR, we'll go direct as possible, picking our checkpoints approximately every 60 minutes. These checkpoints will also be used as our flight watch stations. We must file an altitude in accordance with the semicircular rule. Filing an altitude is important since flight watch stations will give weather for 2,000 feet above our filed altitude.

"In the 'remarks' section of our flight plan we request flight following and list the flight watch stations along the route. For our flight we'll use Vienna, Allendale, and Florence. Base operations transmits this information to the nearest Flight Service Station. They in turn notify the flight watch stations we have designated, giving them essential information such as route, altitude, true airspeed and destination.

"Our time en route is computed by each flight watch station, so they will have an estimate of our arrival. Five minutes before our arrival they prepare a flight condition message for transmission to us when we make our position report. It contains the latest available weather along our route and at destination, and the current abbreviated weather of our next reporting station. Weather is gathered by each station for our route and 50 miles on both sides.

"We must also remember to report any significant weather change that may occur along our route. PIREPS (pilot reports) are of considerable value to Flight Service Stations. If we are more than 15 minutes late in reporting to a flight watch station or fail to report, the FSS will notify our next flight watch of this change in our ETA. A communications search will begin only after the aircraft is one hour overdue at the next reporting point.

"That's about all there is to it, George. So why don't we give it a try?"

Upon receipt of the flight plan, Cairns Operations notified Dothan FSS of the flight, including the request for flight following service. Once airborne Lieutenant Lincoln contracted Dothan, reporting his time off and receiving verification of his flight watch stations. Dothan FSS notified the flight watch stations en route, giving altitude, TAS, type aircraft, and ETE. One hour after takeoff Lieutenant Lincoln contacted Macon Radio, reporting his position over the Vienna Omni. He received his flight condition message and was told to contact Charleston Radio 15 miles southwest of Allendale. The weather report indicated a line of thunderstorms along his route of flight 20 miles northeast of Allendale moving southeast. Macon had advised the possibility of a flight plan change to circumnavigate this bad weather. It was suggested that by going north to Columbia (V-37) and then east to Florence (V-56) the bad weather would be skirted and the flight remain VFR.

Lieutenant Lincoln reported as requested and Charleston Radio advised a new route of flight to avoid the thunderstorms. Lincoln filed as Macon Radio had suggested and also requested that Columbia be added as a flight watch. He was told to contact Columbia Radio 10 miles south of Columbia and was advised that Fort Bragg would be notified of his new ETA.

Ten miles south of Columbia, Lincoln established contact with Columbia Radio and was

Continued on page 9

Here's how to get travelers aid en route

C. FLIGHT PLAN

RADIO CALL: R 48251 | AIRCRAFT TYPE: L-20

POINT OF DEPARTURE: CAIRNS AAF FT RUCKER, ALA

ROUTE TO BE FLOWN

BASE NAME OF DESTINATION: SIMMONS AAF FT BRAGG, N.C.

IFR	VFR	ALTITUDE	ROUTE	TO
	✓	3500	D→	
	✓	3500	V-70	
	✓	3500	V-157	
	✓	3500	D→	

MILEAGE: 420 NAUT. | ETD: 1300 Z

EST TRUE A/S: 105 KTS. | ETE: 3+50

ALTERNATE: — | ETE TO ALTERNATE: —

TRANS. FREQ.: UHF-ALL

PILOT'S LAST NAME: LINCOLN

FUEL ON BOARD: 5 HRS. 30 MIN.

INSTRUMENT RATING

NAVY	AIR FORCE	ARMY
SPECIAL PILOT	PILOT RATING	PILOT RATING 3
STANDARD PILOT	INST. RATING	INST RATING 2

DATE INSTRUMENT CARD EXPIRES: 25 JUN 61

DD FORM 365F FILED AT: — | DATE FILED: —

HIGHEST RANK ON BOARD: —

LETDOWN EQUIPMENT ABOARD AIRCRAFT						LETDOWN AVAILABLE AT DESTINATION						NOTAMS CHECKED	
ILS	VOR	ADF	RADIO RANGE	TACAN		ILS	VOR	ADF	GCA	RADIO RANGE	TACAN	YES	NO
X	X	X	X						X			X	

REMARKS: REQUEST FLIGHT FOLLOWING. FLT. WATCH STATIONS = VIENNA, ALLENDALE & FLORENCE.

Jack Lincoln
(SIGNATURE OF PILOT)

THE ARMY FLYING HOUR PROGRAM

Victor J. Schulte, Jr.

I WONDER HOW many of you Army Aviators, particularly those holding down positions as operations officers, have heard the old story that your aircraft have been restricted to only a limited number of flying hours for this month, quarter, or year? I'll bet that this tune is quite familiar to a majority. Here you are with missions to be flown, aviators needing time to meet their minimums, plenty of flyable aircraft, and yet you are informed that your aircraft are restricted. When you ask why I am sure the reply is either "Lack of funds for POL" or "SB 1-1-1, the Flying Hour Program." Usually the former is blamed on the latter. Since its bark is worse than its bite, it may be of interest to all concerned to learn just a little about this monster "The Flying Hour Program." Why is it required? For what it is used? How is it derived? How restrictive is it?

First of all, the Flying Hour Program is not a "program" at all in the traditional Army sense. It is merely a forecast based on experience, used primarily by logisticians and engineers as a guide for spare parts support and maintenance forecasting. Like all big businesses the buyer of the merchandise must have a market analysis to determine the size of his purchase. In Army Aviation this analysis is expressed in terms of user demand and forecast on user requirements (flying hours). Therefore, it may be said that the Flying Hour Forecast (program) is developed by every user of Army aircraft worldwide and transmitted to a central control point for compilation and analysis via the DA Form 1352.

With the acceptance of aircraft into the military structure some method of requirement measurement was needed on which to base logistical forecasts, operational accomplishments, budgetary and equipment requirements, etc. For aircraft, the standard unit of measure has been accepted as the flying hour; hence, the evolution of the "Flying Hour Program."

The basic concepts of tactical employment of the three services differ because of operations. Implementation of a Flying Hour Program varies within the services, although the usage of the obtained data is similar.

Tactical employment of the Air Force and Naval Aviation are expressed in terms of aircraft units; therefore, flying hours are truly programmed. The accomplishment of their program is enforced by the responsible commander. Conversely, the tactical employ-

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Mr. Schulte is Chief of the Logistical Data Research and Analysis Branch, Logistic Operations Plans Division, Office of Plans and Programs, U. S. Army Transportation Materiel Command, St. Louis, Mo.

ment of the Army is expressed in terms of armies, divisions, battle groups and troops, placing the aircraft in the role of a support vehicle. For this reason the Army does not in reality program aircraft flying hours. It makes forecasts based on experience data.

I know you have probably read or heard somewhere that you cannot fly less than 75 percent or exceed 125 percent accomplishment of the SB 1-1 or SB 1-1-1 over a 3-month period without approval. But have you checked the facts (AR 95-70)? If so, you found that approval is not required.

Instead, an advisory letter to the Chief of Transportation is required so that he can make corresponding adjustments in his planning to provide you, the user, with adequate support.

But what about justifying aircraft presently assigned or providing justification for additional aircraft? This is based primarily on your unit priority. The more you fly the better your justification. Aircraft are rarely withdrawn (except by local commanders) based solely on low flying hour activity.

The basic source for the publication of all flying hour data is the DA Form 1352, "Army Aircraft Inventory, Status and Flying Time (RCS TC-153 (R1))," covered in AR 710-1500-8, 11 October 1956.

It may be said that little, if any, conditioning is applied to the reported data contained in this report. Logically then, the Flying Hour Program (SB 1-1-1) is **your** program. **You** fly it; **you** cause it to be revised; and **you,** in fact, control it. The Transportation Corps merely supports it.

Before any type of statistical report is developed, raw data must be collected from user sources. This is the purpose of the DA 1352.

Upon receipt of the 1352s from all using units, worldwide, Transportation Materiel Command personnel must compile, segregate and validate every entry on each report against known aircraft by tail numbers. Gains and losses through transfer, crash damage, etc. must be determined so that no doubt exists that the inventory is correct. We **do** have trouble keeping track of aircraft (just as you may find it difficult keeping track of organizational tools and equipment).

After the status inventories are validated, all reports are coded for unit identification and processed through Automatic Data Processing (ADP) where they are converted into specific TBM print-outs in several formats tailored to the requirements of COFT, OSIGO, DCSLOG, and other higher level agencies. These "insignificant" forms (in a consolidated and refined state) then form the basis of logistical and budgetary decisions for the operation, support, and procurement of your aircraft and the development of future flying hour forecasts.

The procurement of repair parts in adequate quantities is indirectly the result of demand data gathered through our market analysis.

In summary, the DA 1352 (and resultant Flying Hour Program) belong to every commander, Army Aviator, mechanic, and clerk involved in the operation and management of Army aircraft. Treat it with respect. In turn you will receive more realistic flying hour forecasts, supply support, and additional equipment required to accomplish your mission. □

Continued from page 7

given his flight condition message. The weather along his route would remain VFR with the sky becoming overcast at 6,000 feet at his destination. He was told to contact Myrtle Beach Radio over Florence for his next flight condition report. Halfway between Columbia and Florence he noticed there was a cloud buildup to the north of the flight route. This was not reported by Columbia, so Lincoln made a PIREP to Columbia Radio. After acknowledging this report, Columbia stated that this buildup would not change the flight condition en route but would result in the lowered ceiling at destination.

Over Florence Omni, Lincoln reported to Myrtle Beach radio and was told that the ceiling had already lowered to 5,000 at Fort Bragg, but that the flight should remain VFR. Arriving at Fort Bragg, Lincoln noticed the ceiling had lowered, but remained VFR. After closing the flight plan with base operations, both pilots agreed that flight following had helped facilitate a safe flight. □

Flight Following Service is still in the experimental stage; however, it will greatly enhance a VFR flight if properly used.

Because FFS places additional work on FSS, Army Aviators are not encouraged to use it on each VFR cross-country flight. However, when the pilot feels that the safe completion of his flight is endangered from marginal weather, he certainly should request and use this valuable service.

—EDITOR

Army Aircraft, an Engineering Tool

Captain Ralph L. Trew, CE

BATTLING SOME of the world's worst weather conditions, as well as most rugged terrain, Army Aviation is playing an important role in the construction of military and police installations in Iran.

The U. S. Army Engineer District, Gulf, is responsible for building a series of installations varying in size and complexity from small police stations to division size camps. Flights carrying technical specialists from headquarters in Tehran to remote areas are vital due to a shortage of civilian aviation and surface modes of travel. Even where an available railroad goes to the construction site, an average of 14 hours is required to travel a distance of 300 miles.

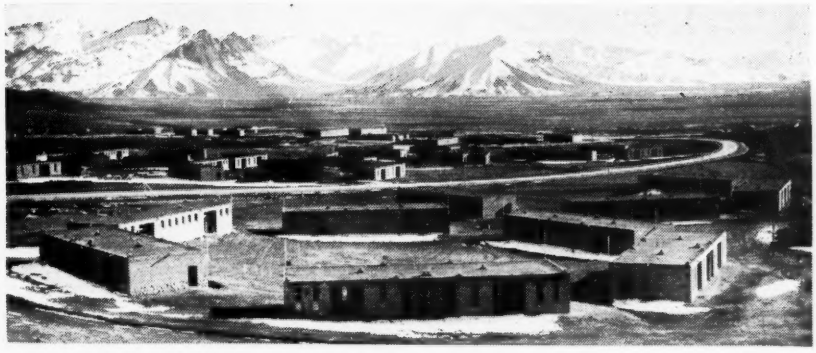
Air transportation was first obtained by contract but later replaced with Army aircraft. The aviation branch flew 2,300 flying hours and 1,000,000 passenger miles during the first 18 months of operation. In an area of unusual conditions and flight hazards, the unit covered 344,000 accident-free miles.

Serving an average of five military construction projects per week keeps the two L-23 aircraft of the unit active. The operational experience of this unit emphasizes the importance of organic aviation as a valuable engineering tool.

The aviation branch consists of four Army Aviators, three enlisted aircraft mechanics, one Department of Army civilian clerk-typist, and one local National hired mechanic's helper. Its mission is to provide timely and economical transportation for the District Engineer, his staff and employees.

Gravel-surfaced airstrips at the major sites are 4,000 feet long and are at an average altitude of 5,000 feet. Predomi-

Capt Trew was chief of the Aviation Branch, U. S. Army Engineer District, Gulf, when this article was written. He is a Senior Army Aviator, dual rated and instrument qualified.



Above: Khaneh, an area typical of the topography and type of construction found throughout Gulf District. Left: Aerial view of the Khaneh area and airstrip. Airstrip is gravel surfaced, 4,000 feet in length and 5,400 feet above sea level.

nantly, they are located in small valleys with approach avenues limited to one direction. Only one site has a radio beacon, but an instrument approach and letdown using this beacon is impractical due to the high terrain and confined nature of the valley. Access to all construction site airstrips is essentially limited to visual procedures. Landings and takeoffs are complicated by high temperatures and dust in the summer and strong winds during the remainder of the year.

Most of Iran is a 5,000-foot high plateau bounded on the north and south by mountain ranges which vary from 12,000 to 18,000 feet. Isolated peaks on the plateau extend up to 13,000 feet. This sets the minimum en route altitudes for instrument flights at 8,500 to 17,000 feet throughout most of the country. The minimum safe instrument flight altitudes between Tehran and the majority of the construction sites are 12,000 to 17,000 feet.

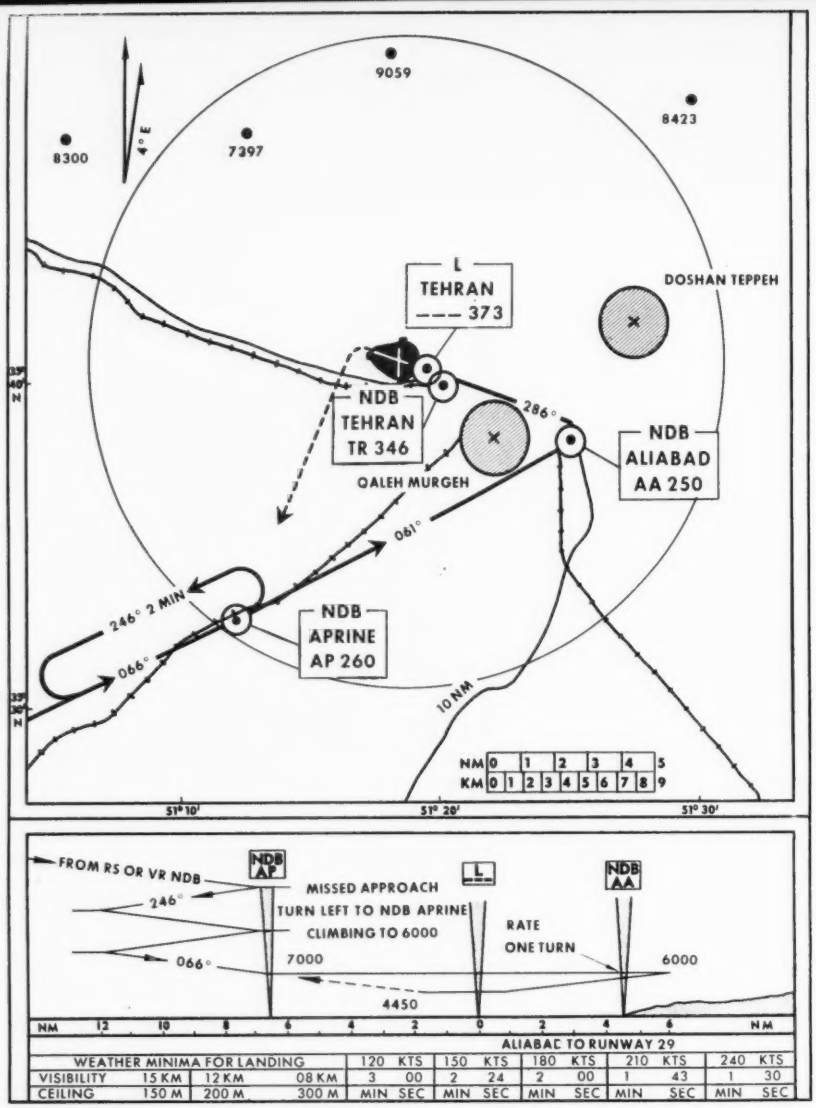
Bad weather usually occurs in Iran between November and February. When instrument conditions exist, either a moderate to heavy rime or a mixture of rime and glaze icing can be expected at the altitudes required for safe instrument flight. Moderate icing seriously affects the L-23's performance at these altitudes. This, plus the fact that the minimum en route altitudes are above the aircraft's single-engine ceiling, prevents extensive instrument flying.

Night flying also is held to a minimum since the Iran Air Traffic Control requires them to be under IFR conditions. This restriction forces the pilot to fly at 12,000 feet or higher and necessitates using oxygen. Night flight altitudes also exceed the L-23's single-engine ceiling. Aviators obtain their annual night flight minimums by making combination training and administrative flights to Dharan Air Force Airfield, Saudi Arabia.

Primary navigation facilities in the Middle East consist of nondirectional homing beacons, located about 150 miles apart. In Iran they are usually powered by small electric generators; and beacons can (and do) go off the air without prior notice.

Such beacons operate in the 200-500 kc band and severe interference is often experienced. All direction indications must constantly be checked against a map for accuracy. A typical ADF approach, such as the one established for Tehran (sketch), may employ four beacons in the approach pattern. The beacon being used during an approach must always be monitored to ensure safety. The unit's two L-23 aircraft are equipped with dual AN/ARN 59 Automatic Direction Finder receivers to cope with these facilities.

Conventional aircraft VHF and UHF radios, familiar to most Army Aviators, are not used extensively in the Middle East. Most airport towers and major international terminals use VHF, but there are very few en route airway reporting stations with VHF radios. The primary air-ground traffic information and control stations use high frequency radio (HF)



WEATHER MINIMA FOR LANDING				120 KTS		150 KTS		180 KTS		210 KTS		240 KTS	
VISIBILITY	15 KM	12 KM	08 KM	3	00	2	24	2	00	1	43	1	30
CEILING	150 M	200 M	300 M	MIN	SEC	MIN	SEC	MIN	SEC	MIN	SEC	MIN	SEC

Typical ADF approach for a Middle East airfield. Not drawn to scale.

for air-ground communication.

The two L-23s carry a 360-channel VHF communications set in lieu of UHF, and a 100-watt, 20-channel, HF transceiver installed in the baggage compartment. The lateral wire antennas (wingtip to vertical fin to wingtip) on the unit's L-23s presented a drag problem. These antennas reduce cruise speed by 8 knots under normal conditions. Under other circumstances, they reduce airspeed even more. The problem was eliminated by installing electrically operated reel antennas.

HF communications produce erratic problems. One example occurred during a night flight to Dharan. While over the Persian Gulf, an aviator was attempting to make a position report to Dharan airport. Unable to establish contact with Dharan, just 150 miles away, he received a reply from Wake Island — 7,000 miles away!

A spare aircraft HF radio converted to ground installation is used as a base set in the District office.

Only four inflight emergencies have occurred so far.

- An engine was shut down as precaution due to smoke trailing from it.
- An engine failed due to exhaust valve breakage with extensive damage to the No. 3 cylinder.
- The landing gear failed to extend due to the spur drive gear failure.
- An engine malfunctioned in flight due to a cracked cylinder head.

All organizational maintenance and about 90 percent of field maintenance is done by the assigned mechanics. A technical representative gives the branch periodic assistance.

The ability to rapidly move engineering data, mail, reports, test materials, and key personnel to and from job sites greatly reduces construction delays. The regular, dependable, and safe operation of the aircraft have contributed immensely to the effectiveness and the morale of District personnel. In the Gulf District these aircraft are as much an engineering tool as a bulldozer, a power shovel or a dump truck. Their use contributes significantly to the efficient and economical accomplishment of the District's mission. □

An assigned mechanic, assisted by a local National, changes a cylinder on one of Gulf District's two L-23s.

The Mohawk's Martin-Baker Seat

Arthur M. Heiniman

WITH THE ADVENT of the AO-1-AF MOHAWK into the Army's inventory (DIGEST, Sep 1960), part of its equipment included the Martin-Baker ejection seat. The seat's arrival prompted an ambivalent reception. Comments ran good, bad, indifferent, comical, severe, concerned, and, last but not least, unbelieving. This article is devoted to the proponents of the latter.

Back in 1944, the British Air Ministry took heed of the increased difficulty experienced by their pilots in effecting normal over-the-side bailouts from that era's aircraft. Slipstream forces and adverse g conditions were growing greater than ever before in their Spitfire and Hurricane aircraft. Rapid development in fighter aircraft, especially jets, only promised an aggravated situation. Thus, the Ministry invited the Martin-Baker Aircraft Co. Ltd., to investigate the feasibility of an assisted escape system.

An initial design concept was prepared and a drawing submitted which presented a swinging arm mounted atop an aircraft fuselage (fig. 1). The aft end of the arm was attached and pivoted just forward of the fin and its forward end was provided with a U-shaped piece which engaged rings on the pilot's parachute harness. This swinging arm, actuated by a powerful spring, was intended to raise the pilot out of the cockpit and clear of the aircraft structure. Although

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Mr. Heiniman is the Grumman Aircraft Engineering Corporation service representative assigned to the Mohawk program at Fort Rucker, Ala.

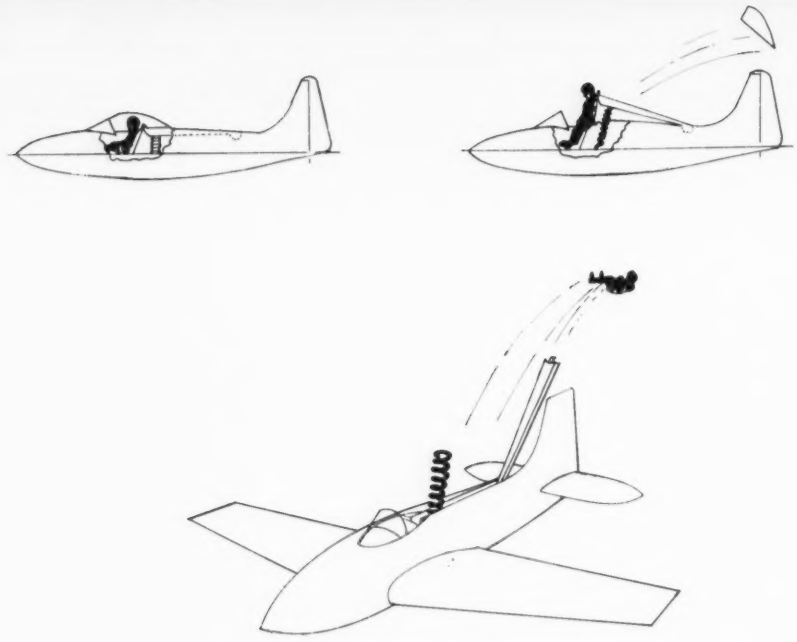


Figure 1

well received, this theory fell by the wayside when it became clear that the most attractive method of emergency egression would be forced ejection of the seat with the occupant still sitting in it.

The manufacturer began to explore areas of mechanical design and physiological reaction about which relatively little was known. Thousands of hours were devoted to development work and subsequent dummy firings on test rigs. Eventually a human spine and a cadaver were acquired for mechanical tests in order to more fully learn the effect ejections would have on the spinal region of the body. Conclusions reached were that the human body could withstand relatively high accelerations without physical injury, providing the spinal vertebrae were square to each other, that the peak accelerations were limited to about 26 g, and that the g came on relatively slowly. (These factors have now been universally accepted as design criteria for ejection seats.)

The first Martin-Baker ejection was made in July 1946, in England. It was a planned and completely successful ejection, executed from a Meteor aircraft at 8,000 feet and 278 kt. American interest was stimulated about this time and a test rig was erected at the Philadelphia Naval Yard. A Martin-Baker seat was also installed in the rear cockpit of an A-26. A series of dummy ejections from both rig and aircraft culminated in a successful live ejection in November 1946. Back in Britain the seat was further developed, successfully demonstrated, and put into production in 1947. The Meteor, Attacker, Wyvern, Canberra, and later the Sea Hawk and Venom aircraft were successfully outfitted.

During succeeding years the Martin-Baker seat underwent further transformation. The need arose for pilot protection during high altitude and high g ejections. The seat necessitated lightening for lighter aircraft and demanded a higher trajectory for higher tail surfaces. It was further realized that ejections around the world which were made at under 2,000-foot altitudes were all too unsuccessful. As a result ancillary equipments were added and refinements introduced out of which was born an automatic low-level ejection seat capable of runway ejections.

In August 1957, an RAF Flying Officer successfully ejected from a Grumman F9F-8T at the Patuxent River Naval Air Test Center, Patuxent River, Md. The ejection was made at 110 KIAS, zero foot altitude before a large group of Naval personnel and press representatives. This writer witnessed the ejection and was very favorably impressed. Others were equally impressed, for the Martin-Baker representative spent the following days measuring current Naval aircraft for possible installation of his product. (Between spots of tea he depicted the "illustrious tailor" as he went about his work with the tape, pad, pencil, and chalk he had so thoughtfully brought along.)

The Martin-Baker seat has since been fitted to nearly 20 types of American aircraft and is in service with aircraft in 35 nations throughout the world. Just under 400 successful ejections have been recorded over speed ranges up to Mach 1.7 at 40,000 feet and at altitudes from ground level to 56,000 feet.

This article is not intended as a thesis on Martin-Baker seats nor as a supplement for formal indoctrination. However, it is befitting to undertake a cursory description of the seat installed in today's Mohawk and its principle of operation.

As an occupant seats himself in the Mohawk, he will be

wearing a B5 quick fit harness and will place a fabric garter around the calf of each leg (fig. 2 and 3). The garters will attach to two leg restraint cords by quick release fittings (fig. 2). Similar fittings (fig. 3) located about the shoulders will secure the occupant's quick fit harness to his personnel parachute and harness inertia reel (fig. 2), which are attached to the seat. Two vertical support straps (fig. 3), sewn to the quick fit harness, will be slipped over the male lap bolt fitting (fig. 3) and the conventional lap belt will be fastened.

With the occupant so restrained, he can lock or unlock his inertia reel using a lever on the left side of the seat bucket (fig. 5). His seat can be raised or lowered by actuating a toggle switch (fig. 4) located on the right side of the seat bucket. Forward of the seat position switch is a yellow and black stripped knob (figs. 2 and 4, manual override lever) which, when moved up and aft, will release the pilot from the seat with his parachute and seat pad. Provided are the usual microphone and oxygen pickups and the traditional "green apple" (fig. 4) for actuating the emergency oxygen bottle (fig. 4).

A normal ejection is accomplished by pulling the face blind (fig. 6 and 7) by the handle located directly over the pilot's head (fig. 5). An alternate or secondary handle (fig. 2 and 3) is located between the pilot's legs on the forward portion of the seat pan. This alternate handle is provided in the event the occupant cannot raise his arms under excessive g conditions. Both handles are yellow and black striped and each is equipped with a ground safety lock (fig. 3 and 4) which is readily accessible to the occupant.

Each handle is capable of firing the seat. When either is pulled, a sear is extracted from the firing pin for the primary cartridge in the ejection gun. Once the primary cartridge is fired, the seat starts its ascent. As the seat initially moves upward, two auxiliary cartridges attached to the side of the ejection gun are uncovered and flame fired, adding to the propellant force. As the seat rises, the occupant's legs are drawn against the seat bucket and restrained by the leg restraint cords to prevent flailing as the seat leaves the aircraft.

The trajectory of the occupant will be 60 to 80 feet. (It is likely that the heavier indi-

Figure 2

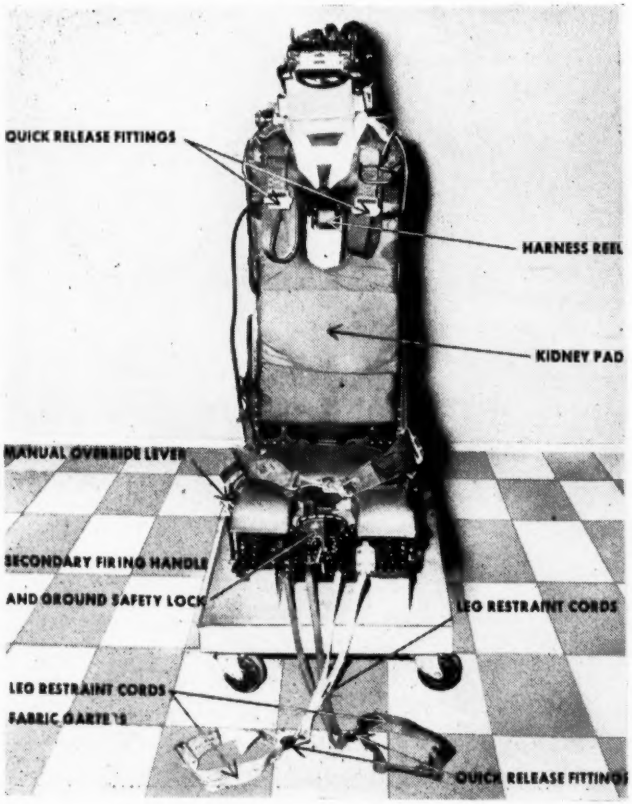
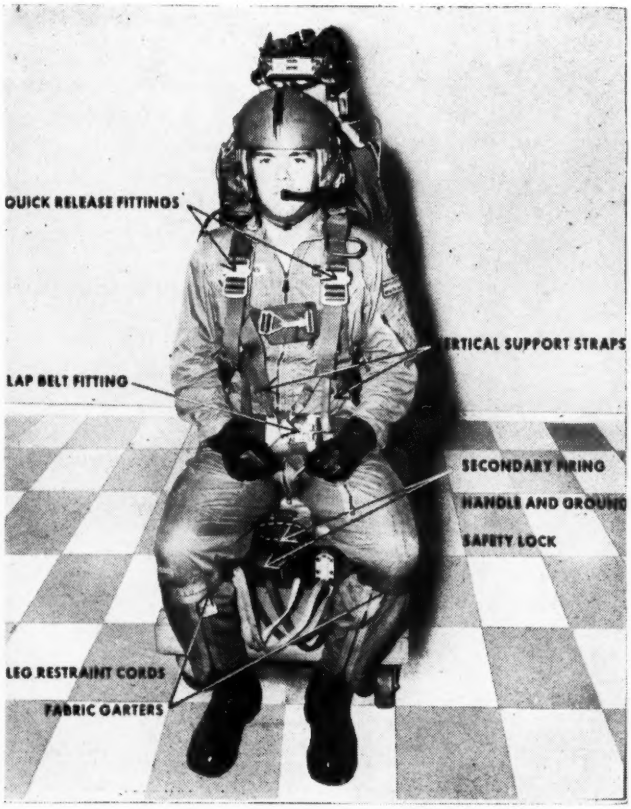


Figure 3



vidual will experience a lower apogee.) The average ejection gun velocity is approximately 83 fps, and the average g force imposed on the individual is approximately 16 g's. (The highest g loading encountered during Mohawk tests was 21 g's. This was imposed on a 5 percentile or very light dummy.)

As the seat leaves the aircraft a trip rod will pull a sear from a drogue gun (fig. 5) and from a time release mechanism (fig. 4) mounted to the seat. The drogue gun fires one half second after its sear is extracted and thus propels a piston or slug which withdraws a 22-inch controller chute by means of a connecting line. The controller chute in turn unfolds a 5-foot stabilizer chute which terminates at a shackle held in a restraining scissor at the top of the seat. The occupant in his seat is thus stabilized and decelerated in preparation for the deployment of his personnel parachute and subsequent separation from the seat.

The time release mechanism, triggered at the same time as the drogue gun, is delayed 1½ seconds, at which time the movement of its two plungers—

- Allows the drogue chutes to extract the **24-foot personnel parachute** (fig. 4) by opening the scissor at the top of the seat.
- Releases the occupant's harness and lap belt from their seat attachment points.
- Frees the leg restraint cords from their sockets.
- Releases the face blind, preventing the occupant, whose hands might be "frozen" to it, from dragging the seat behind him.

Temporary restraint for the occupant in the seat is maintained after the harness and lap belt is unlocked from the seat by two spring loaded sticker clips. This prevents collision with the seat during the separation process, and ensures positive separation of the occupant from the seat when the "jolt" of the personnel parachute occurs. Once the personnel parachute blossoms and a clean separation is made from the seat, the rate of descent is 23 fps and a normal parachute ground contact can be expected.

In the case of a zero feet altitude ejection at 100 KIAS, the elapsed time from curtain pull to ground contact is approximately 5 seconds.

Figure 4

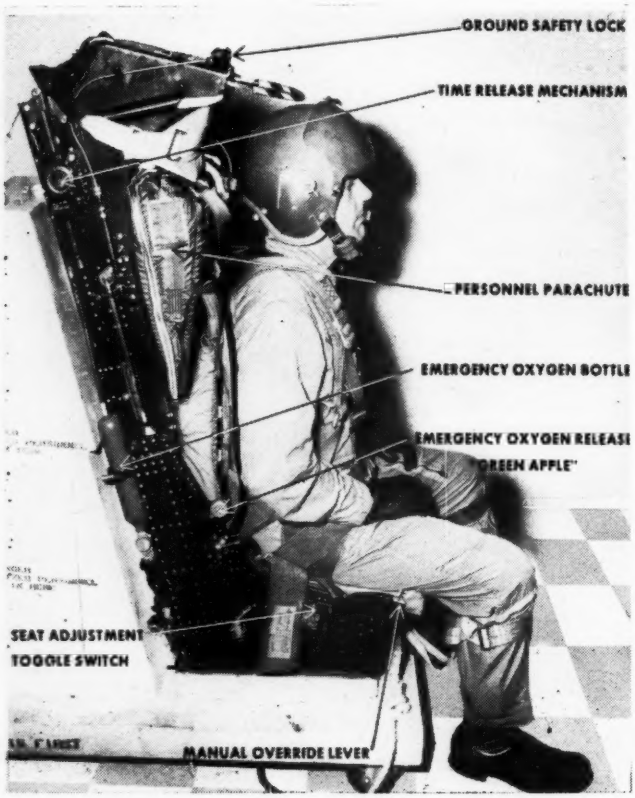


Figure 5

Figure 6

Figure 7

If an ejection is executed above 15,000 feet, or when a force of four g's or more is acting upward and parallel to the main vertical axis of the seat, the time release will be delayed allowing the occupant to remain attached to the seat and stalling the deployment of the personnel parachute. This will assure a rapid stabilized descent to approximately 15,000 feet in the event of high altitude ejection and will preclude damage to the personnel parachute and harness should high velocities be encountered during ejection.

It is difficult to anticipate queries regarding the Martin-Baker seat, but there is one subject to which Mohawk pilots refer most often. It is that of discomfort derived during and lingering after long flights. This discomfort appears more pronounced in the lower, forward portion of the occupant's pelvic promontory. In defense of the cushioning of the Martin-Baker seat, if the seat were any softer it would greatly deteriorate the chances of an ejectee escaping spinal injury. Physiologists have been and are now working towards an improvement in the comfort aspect of the seat. The introduction of an adjustable kidney pad (fig. 2) is their latest contribution.

The betterment of the Martin-Baker seat continues. The feasibility of a 0/0 capability is currently being explored in the form of a rocket equipped ejection gun which would accept the present configuration of Martin-Baker seats. Some American manufactured seats already employ rocket features, and these seats are constantly being improved.

With VTOL aircraft on the horizon and as nap of the earth techniques gain proximity to the earth, more and more Army Aviators must become keenly inquisitive about their cockpit environments. The improved mission capability of the Mohawk and its successors can only be enhanced by the survival equipment installed.

In closing, we would suggest that those anticipating flying in the Mohawk know their seat well. If **you** ever have cause to eject, the statistics bear out that a precise documentation of the ejection should be compiled and a "thank you" note sent to the manufacturer. **Most important,** both papers would be autobiographical. □

H-13E MAIN ROTOR BLADE flexed downward and struck tail boom. Caused by downwash from low approach of H-21 which passed overhead. H-13E was parked with engine shut down and main rotor still turning. Major damage to main rotor blade and top left rear longitudinal bar of tail boom.

L-19E ENTERED DOWNDRAFT while on search mission in mountainous terrain. Aircraft was forced down into canyon, struck powerline and crashed. Observer sustained minor cuts and bruises. Pilot escaped with no injuries. Aircraft destroyed.

H-34C TAIL ROTOR DAMAGED by socket wrench handle which was left by maintenance personnel on top of screen covering tail rotor gear box. Incident damage estimated at $1,085.

H-21C ENGINE FAILED in flight. Aircraft made turning autorotation, landed on right main gear and rolled on right side. Major damage. No injuries. Caused by internal failure of unknown part or parts. Oil sump contained many metal particles.

H-13E MAIN ROTOR STRUCK POLE while aircraft was being directed into parking area by guide. Major damage to all components. No injuries.

L-19E CRASHED in a wooded area during apparent attempted demonstration wingover and letdown for contour approach to strip. Aircraft entered high speed stall during pull-out and mushed into trees. Fuel tanks were ruptured and fire began shortly after impact. Instructor pilot and student pilot sustained fatal injuries. Aircraft destroyed.

HU-1A CRASHED during night approach to land. Windshield fogged over and pilot was unable to see. Ground haze was contributing factor. Aircraft destroyed. No injuries.

H-37B EMITTED SMOKE AND FIRE during takeoff. Successful forced landing was made and fire extinguished. Fire caused by rag which was left on transmission deck under cowling. Transmission oil cooler belt drives burned. No other damage.

H-13H STRUCK WIRES while hovering to parking area. Major damage. No injuries.

L-19A STRUCK TREE during landing approach. Incident damage. No injuries.

L-20A STRUCK WOODEN PYLON while taxiing to parking area. Incident damage. No injuries.

AO-1 RIGHT TIRE BLOWN during landing roll. Caused by excessive use of brakes. Incident damage to right wheel assembly.

AO-1 DEVELOPED HYDRAULIC LEAK between barrel halves on propeller hub of No. 1 engine. Aircraft completed forced landing with no damage. Hydraulic leak caused by corrosion spots on front and rear of barrel halves. Cause of corrosion undetermined. UR was submitted.

AO-1 GEAR RETRACTED during touch-and-go landing. Pilot reached for flap handle after touchdown to raise flaps to takeoff position. He inadvertently grasped the gear handle and raised it to the up position. Major damage. No injuries.

H-21C ENTERED FOG during return flight from search mission. Aircraft crashed into trees and high ground. Pilot killed. Copilot and crewchief escaped with minor injuries. Major damage.

AO-1 MOHAWK H-21 SHAWNEE L-20 BEAVER

Excerpts From Aug. and Sept.

L-23 SEMINOLE H-37 MOJAVE AC-1 CARIBOU H-19 CHICKASAW

H-13G BEGAN TO SETTLE during low-level flight. Aircraft was landed and it started sliding backwards. Pitch and forward cyclic were applied and aircraft veered to left. Main rotor blade struck tree and aircraft rolled on right side. Gasoline dripped on mufflers and started fire. Aircraft destroyed. Pilot and passengers escaped with no injuries.

H-21C STRUCK TREES during shallow approach to landing. Major damage to rotor blades and horizontal stabilizer. No injuries.

H-34C CRASHED in ice and snow shortly after takeoff. Engagement of the ASE at altitude of 100-150 feet with ASE motor control override switch in "left-forward-down" (hard-over) position caused aircraft to enter attitude from which pilot could not recover prior to impact. Pilot, copilot, crewchief and three passengers sustained fatal injuries. Aircraft destroyed.

HU-1A ENGINE FAILED in flight. Aircraft completed autorotative forced landing with no damage. Oil line from tank to engine ruptured, causing engine failure.

H-34C STRUCK TREE STUMP during approach to confined area. Incident damage. No injuries.

H-13E STRUCK WIRES in flight. Flight control push-pull rod severed by wire strike. Control was lost and aircraft crashed in heavily wooded area. Pilot and passenger sustained minor injuries. Aircraft destroyed.

U-1A ENGINE FAILED shortly after takeoff. Aircraft struck telephone pole during forced landing. Pilot sustained cut on right heel and copilot suffered broken leg. No other injuries. Major damage to aircraft. Caused by materiel failure in No. 9 cylinder.

H-13H STRUCK POWERLINE during takeoff. Aircraft exploded in air and burned. Pilot killed.

L-19A STRUCK WIRES during contour flight along riverbed. Aircraft destroyed. Pilot escaped with minor injuries.

H-13H ENGINE OVERSPEED occurred during power recovery from 180° practice autorotation while aircraft was on test flight. Rotor rpm lost and aircraft landed short of intended spot, struck rock, rolled over and burned. No injuries.

H-13H STRUCK WIRES during takeoff. Major damage. No injuries.

H-19 STRUCK LIGHT POLE while taxiing to takeoff position. Major damage to main rotor blades, rotor head, transmission and fuselage. No injuries.

U-1A STRUCK L-20A while taxiing forward on ramp. Incident damage to both aircraft. No injuries.

H-13H MAIN ROTOR STRUCK TREE during message drop. Major damage to main rotor blades. No injuries.

H-37A SETTLED INTO TREES after takeoff due to power loss. Major damage. No injuries. Cause of power loss undetermined pending investigation.

H-23D EXHAUSTED FUEL in flight and tail rotor struck ground during flare for autorotation landing. Major damage. No injuries.

H-21C ENGINE FAILED at hover during test flight. Aircraft landed with no damage. Intake valve failed in No. 6 cylinder, damaging piston. Metal particles from piston entered all cylinders through impeller and intake system.

From The USAAVNS

DEPT OF MAINT

The first automatic stabilization equipment familiarization class was taught to an Officer Rotary Wing Aviator Class on 29 June 1961. The eight students felt that this 5-hour familiarization of ASE cockpit procedures and the short demonstration ride was well worth the time spent and will be of great benefit to them.

In keeping with the great strides made by Army Aviation, and to further expand the Army aircraft mechanic's knowledge and ability to maintain rotary wing aircraft, the Department of Maintenance began the first scheduled maintenance class in automatic stabilization equipment (ASE) on 14 August.

If maintained properly, ASE can be the best copilot an H-34 Choctaw pilot ever had. The response of an ASE input control correction is approximately 200 times faster than human reaction. The Choctaw is the first Army helicopter equipped with ASE (see DIGEST, June 1960). But it is only a stepping stone to the automatic stabilization equipment and automatic pilots that Army Aviation will have in the future.

A team of Sikorsky technicians has completed equipping the H-34 flight control trainer with ASE. This trainer can simulate all flight conditions and ASE responses of an H-34 in flight. It will be used, in conjunction with two ASE equipped H-34s, to teach mechanics the electronic structure and theory of operation plus test procedures, adjustments, and trouble shooting.

Instructors will place all known troubles and malfunctions in the trainer. The students will then be given ample time to diagnose the trouble, make the necessary adjustments or replace defective components to keep the ASE on "flight status."

CDO

CDO is currently preparing a Qualitative Materiel Requirement for a portable air traffic control shelter. A review of Army Aviation operations points out a need for a lightweight, compact shelter to house all personnel and sensitive items of ground communication and navigation equipment necessary to support IFR operations of Army aircraft in the field. If aviation units are to operate when marginal VFR or IFR weather conditions prevail, selected airfields or landing sites must be equipped for IFR operations.

Thus, the shelter would be used on selected division or Army airfields requiring an IFR capability, and for airmobile or airborne operations where extended IFR operations are anticipated. To meet the operational requirements envisioned, this equipment must have the following capabilities:

- Air transportable in Air Force transport aircraft.
- Air transportable by the Army light tactical transport.
- Day and night operations.
- Operation in temperate and tropical climates.
- Provision for the visual observation of local VFR traffic.
- Transportable on several standard ground vehicles.

Bulky items of equipment such as radar antennas and auxiliary power units will not be an integral part of the shelter unit and can be carried as a separate load if necessary during transport.

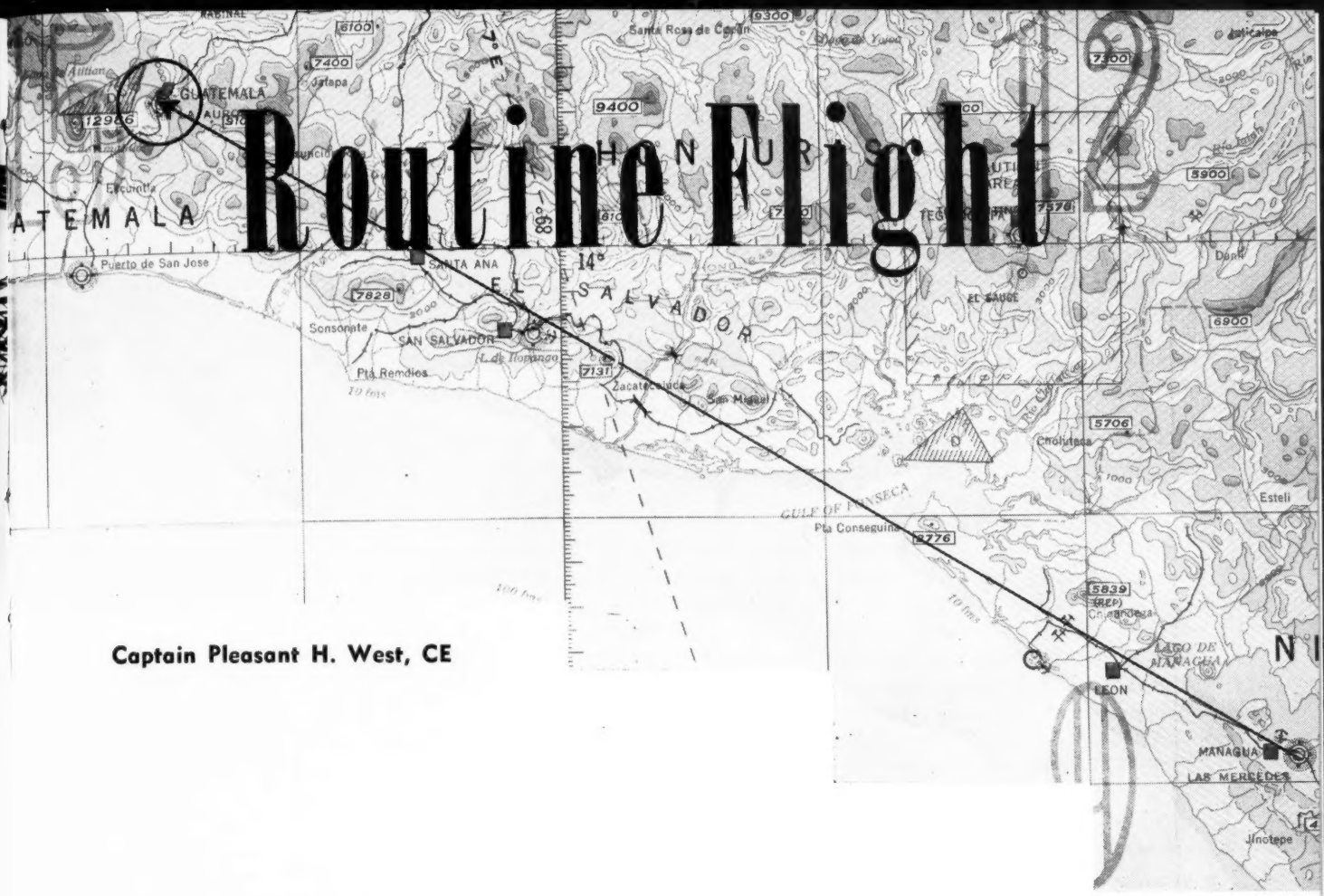
DEPT OF TACTICS

Research, Doctrine and Staff Division: Master Lesson Plans (MLP) for POI 1-A-F30, "Army Aviation Command and Staff Officer Course," are now available for distribution through the Department of Publication and Nonresident Instruction, USAAVNS. Eighty percent of the MLPs have been reproduced in the final form; some 10 percent are in the process of final reproduction. The remaining MLPs will not be reproduced in final form because of the anticipated changes due to new TOEs.

FM 1-( ) "Aerial Observer Training" has been completed and forwarded to USCONARC for approval and final publication. This FM incorporates the findings of Task OBSERVE of the U. S. Army Aviation Human Research Units. When published and distributed, the manual will assist greatly in the conduct of aerial observer training.

Continued on page 31

Routine Flight



Captain Pleasant H. West, CE

ON A ROUTINE MISSION, we filed VFR out of Managua via direct Guatemala City (280 miles) with 3 hours en route and 4 hours fuel on board our L-20. At this time our departure, destination, and en route (San Salvador) weather was **definitely** VFR. Climbing on course, we topped a scattered cloud condition at 9,500 feet. Our first hour's fuel consumption was about 26 gallons (not excessive considering the load and climb to altitude).

About 1½ hours after takeoff we were on course 25 miles southeast of San Salvador and realized we were going to have to let down and circumnavigate the towering cumulus on our proposed flight path. We had contact with our IAGS radio in Guatemala but was not able to raise any civil radio stations for weather. A pilot's report at Guatemala City indicated VFR conditions with "plenty of blue overhead with the south and east ridges open" (our proposed route).

Because of the weather outlook between San Salvador and Guatemala, as seen from our present position, I decided to land at San Salvador and refuel. San Salvador had a thunderstorm with heavy rain in the vicinity. I spent 10 precious minutes in the area trying to make radio contact to no avail. Consequently I wasn't able to obtain the best avenue of approach, and decided to continue to Guatemala City. (I found out later that a political disturbance had just begun and the field was closed.)

Weather between San Salvador and Guatemala City appeared to be broken to overcast, with visibility about 15 miles and cloud bases 1,500 feet and tops up to umpteen thousand. I elected to generally follow the coastline and fly at about 1,200 feet. Thirty-five miles out with 30 gallons of fuel aboard, I was homing into Guatemala City from the SE on ADF. Aviation personnel on the ground at Guatemala City informed me that there was still about 2,000 feet clearance on the southeast ridges with blue holes visible about 10 miles south. Based on this I decided to attempt to fly VFR to the city. I was unable to remain under the clouds because

Capt West is a member of the 937th Engr Co (Avn) (IAGS). He is dual rated and instrument qualified with approximately 2,600 flight hours.

the terrain sloped up to the cloud base. So I climbed up to see what altitude would be required to reach the "blue holes" south of the city.

At 6,000 feet I was 500 feet on top of one layer in a corridor that appeared to lead to the broken condition south of the city. I had about 4 miles cloud clearance on each side from the towering cumulus and rain forming the sides and end of the corridor. At this time I **could have turned toward the coast** (known broken conditions with good visibility) **and landed** at one of several small airstrips, or **continued toward Guatemala City and descend through the reported "holes"** and gone in under the cloud layers. **I elected to do the latter.**

My corridor extended an estimated 15 miles and at the end of it was a hole with the ground visible. The terrain did not look familiar but I was **sure** I was close. I let down to 4,000 feet and was about 20 miles south-southeast of the city instead of my expected 10 miles. At this time I had approximately 22 gallons fuel. I was unable to continue towards the city due to low clouds and rain in nearly all directions.

Reversing my course I went back to look for the hole through which we had descended. It was gone. We continued looking for an opening in the mountain ridge and was just barely able to remain clear of the clouds. At this point I **could** have climbed back up IFR into the clouds and gone to the coast (MEA 14,500 feet). But based on my now limited fuel supply, higher fuel consumption in a climb, numerous towering cumulus clouds with rain and suspected severe turbulence, and several mountain peaks up to 12,500 feet in the immediate area, **I decided to remain below and keep looking.**

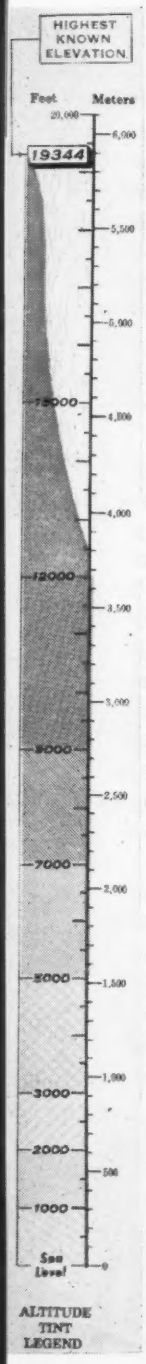
IAGS radio in Guatemala City now indicated an estimated 3,000-foot overcast with small parts of the ridges still visible. I had some ridges from 3,000 to 6,000 feet high to cross and I had to find an opening in the ridge. Continuing in a northerly direction, we picked up the Guatemala - Salvador highway. I **could** follow this to the city in almost zero-zero weather. Following it to the city was impossible; it went right into the clouds. We were in a small valley about 2 miles long, surrounded by low clouds, rain, mountain ridges and with the highway running through the middle.

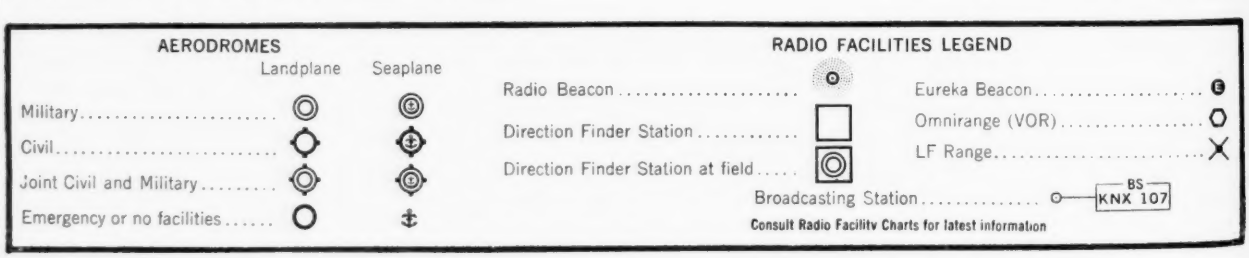
I **could** have gone IFR for about 15 minutes and reached Guatemala City, but there's no approved letdown and I was down to 16 gallons of fuel. Had I any doubts about a safe landing on the highway, I would have done this, but I was absolutely **sure** I could make it. Reporting our exact position to the IAGS radio in Guatemala City **I informed them we were going to land and wait for good weather.**

The section of road I selected was about 1,500 feet long, uphill with about a 4 percent grade. An outcrop of rocks was on each side about one-third the distance up the road from the approach end. It was paved but very wet. A big stake-body truck was parked on the approach end. The weather was moderate rain with clouds about 200 feet above the road, but down to the ground about 300 feet from the approach end. Visibility about 1 mile out of clouds.

I still had sufficient fuel and was **absolutely** confident I could land safely. As we've all said before, "I have landed in worse places than this." I decided to make my touchdown point just past the rock outcrop, thus cutting my usable strip down to about 900 feet. Even though **sure** the wings would pass the rocks with space to spare, I did not want to take an unnecessary risk. I made three passes and realized that my turn to final approach was going to be quite short, but "no sweat."

During these passes over the area a big truck was going up the road, but I **thought** it would be over the hill before I touched down. As I turned final the truck still had about 100 feet to go. After touchdown and with all wheels on the ground, I realized the truck had stopped right at the end of my proposed usable roadway. I probably could have stopped. Whether or not I would have hit him will never be decided. I made a go-





around and set up another approach. It became obvious that the truck driver wanted to see the show.

My only alternative was to move my touchdown point as near as possible to the truck parked on the approach end. Making a smooth landing I had all wheels on the ground about 200 feet before the rock outcrop. Apparently I allowed the aircraft to skid left instead of staying in the middle of the road. I assume I was preoccupied with the truck on the road in front of me. I had slowed to about 35 kt when my left wing struck the rocks about 3 inches inboard from the tip.

Things then went from bad to worse. The blow on the wing started the aircraft into a slight left turn. I applied hard right brake but could not stop the turn, due to the wet surface. The left wing struck the rocks six times, turning a little more each time. Skidding off the road, the right gear sheared and we came to a sudden halt.

The truck full of people promptly moved out. The show was over. We were 12 miles from Guatemala City.

Post-mortem revealed that **had** I stayed in the middle of the road I would have had about 2 feet clearance on the left wing. I am not sure what you would consider the primary contributing factor toward getting into this predicament. Perhaps overconfidence. I have flown out of Guatemala City for over 2 years and during about 6 months out of the year. After twelve o'clock, a minimum clearance approach to the city is more the case than the exception. We have made many such approaches to the city and will probably have to make more. But I have learned **my** lesson.

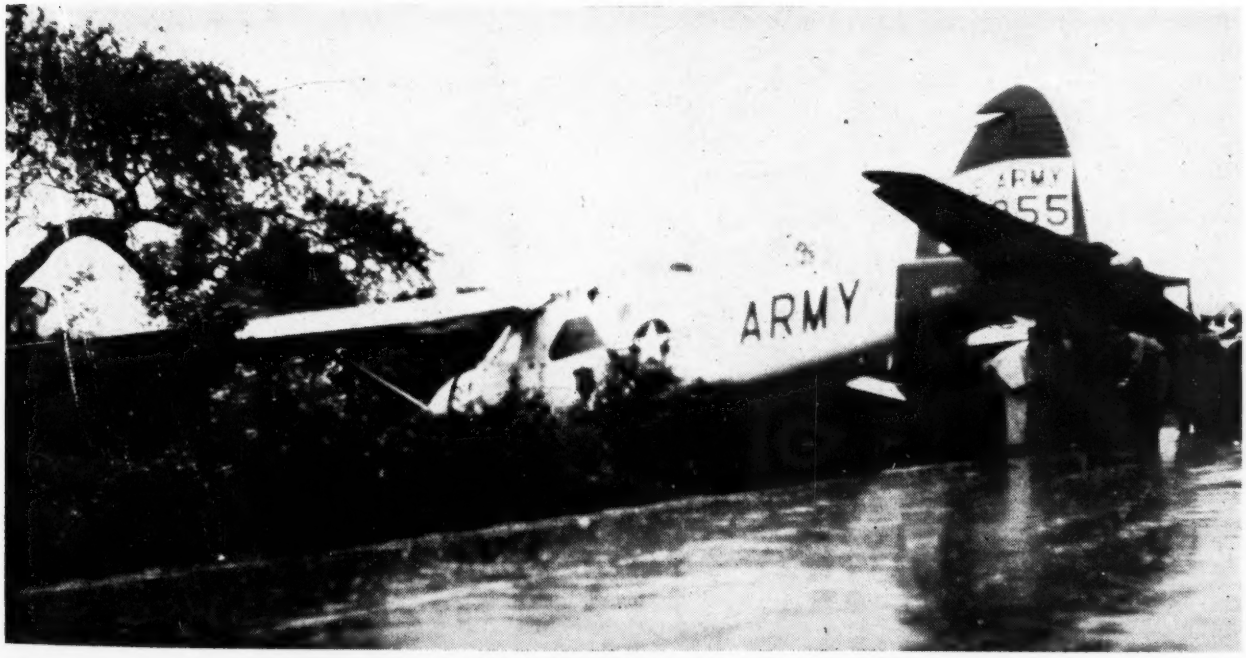
Flying in Central America under **marginal** VFR conditions is asking for trouble, and when you go IFR there you are **already** in trouble. Weather forecasters are practically nonexistent; many of the NDBs are gasoline operated and of course susceptible to impromptu breakdown; the MEAs look like the national debt; and the distance to alternate airports is normally prohibitive. For our single-engine aircraft with low service ceiling and limited oxygen supply, the questionable facilities and mountainous terrain make it unfeasible.

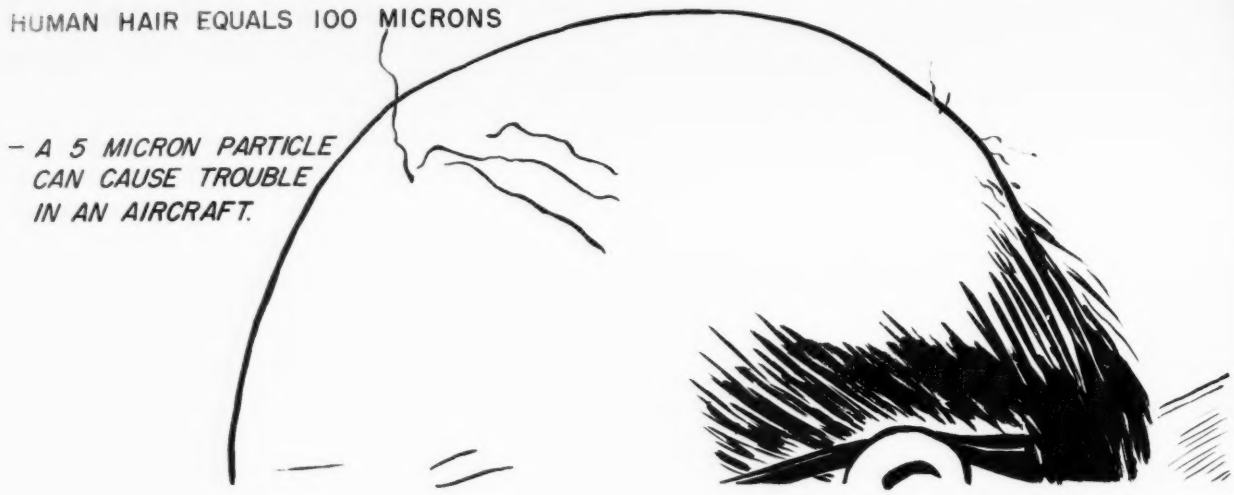
Normal VFR flying is "no sweat." Most of our charts are of the late 1940 vintage with the pretty dotted contour lines, and are not at all cluttered up with names and symbols.

If I sound bitter it is just that I had an accident. I feel that it **could** have been avoided if I had paid **more** attention to weather before me and placed **less** confidence in my ability to sneak around in **marginal** weather. The net results are:

- one L-20 that will never fly again,
- work delayed on project until aircraft can be replaced,
- self-pride punctured,
- a tremendous amount of respect gained for weather conditions in Central America. □

End of a routine flight?





Fuel Handling Problems

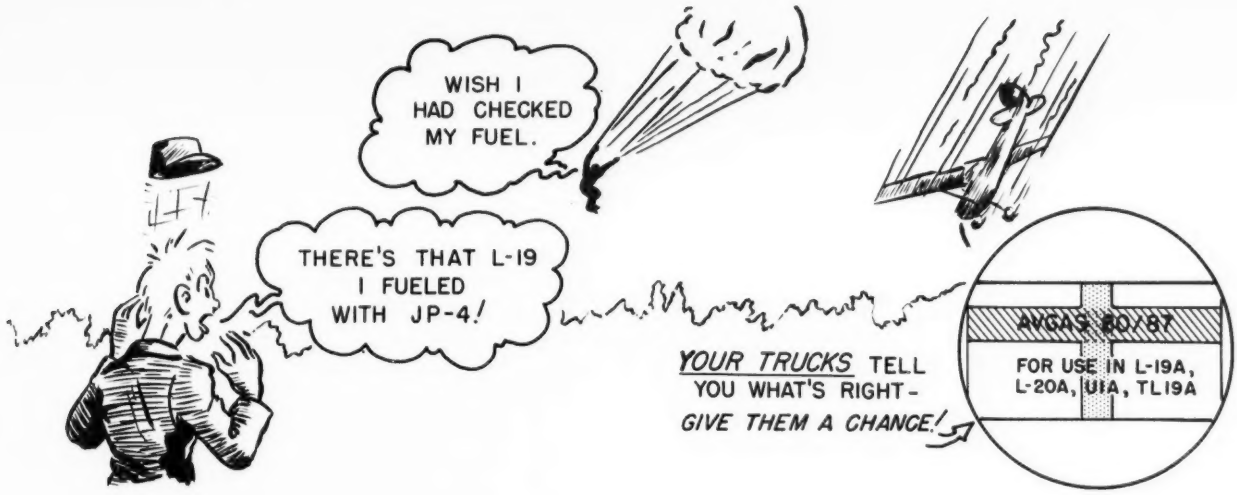
Lieutenant Arthur J. Cornell, QM

AVIATION FUEL has been called many things, "liquid dynamite," "colored firepower," and "a necessary evil." However, treated with healthy respect, common sense and knowledge, your refueling problems can be virtually erased.

Commingled or contaminated fuels is only one of many problems of safety that confront the Army's aviation fuel handling personnel.

Problems begin as the fuel leaves the refinery. Rust, dirt, and water begin to contaminate the fuel in tankers, barges, and rail cars. These problems are "dumped" in the tanks of local POL personnel. Here two safeguards enter the picture: the Quartermaster Corps laboratory technicians and the micronic filter separators. The lab people sample and analyze each incoming batch, testing it for proper components and condition. These specialists assume the position of an advisor, giving the commander constant guidance in disposition of aviation fuels. The filter-separators filter out the rust and dirt and remove the water. But filters wear out and become clogged. Remember to change them at least once a year — every 3

Lt Cornell was POL Officer, Airfield Command, USAAVNS, Fort Rucker, before his recent return to civilian life.


WISH I HAD CHECKED MY FUEL.
THERE'S THAT L-19 I FUELED WITH JP-4!
YOUR TRUCKS TELL YOU WHAT'S RIGHT - GIVE THEM A CHANCE!
AVGAS 80/87
FOR USE IN L-19A, L-20A, U1A, TL19A

months if the tanks aren't coated. Effective filtration doesn't end at the storage tank. Additional 5 micron filters on each refueling vehicle ensure the delivery of clean and dry fuel into the aircraft.

"But Lieutenant, grounding every aircraft is a waste of time." A common complaint that never seems to be adequately answered. Yet, the major cause of petroleum fires is static electricity. A major fire was averted recently when a quick thinking mechanic smothered a fire started by a static spark jumping between the man's finger and a leaking drain valve on an H-37.

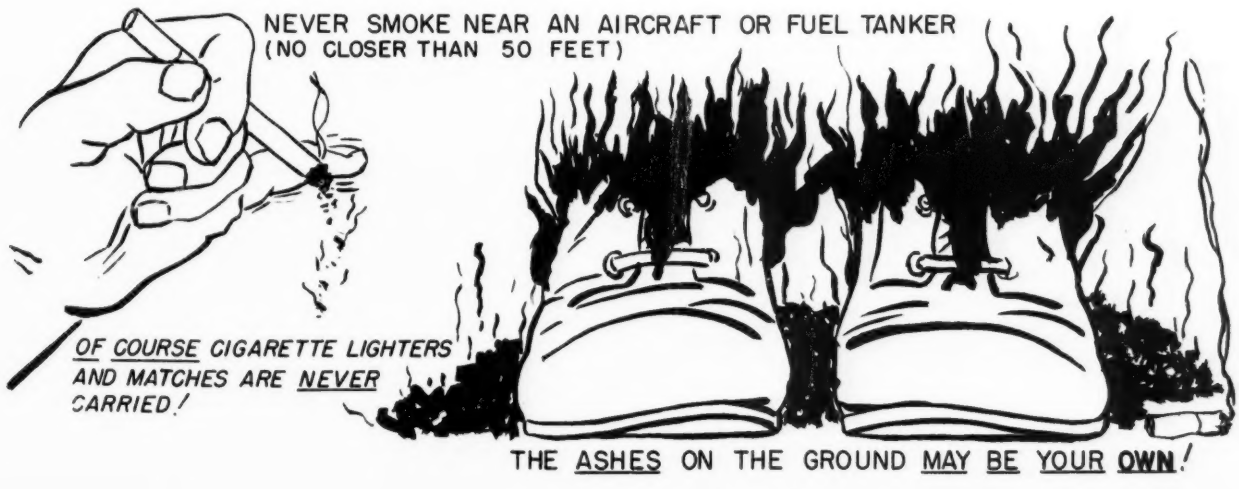
Fuels, especially JPs, may generate their own static electricity as they flow through lines and fittings. This is why each vehicle must be grounded when loading or unloading in a storage area. Often, the static buildup between an aircraft is different from that of the refueling vehicle or personnel. This charge is equalized by contact. Often a spark is discharged when the contact is made. For this reason, grounding is accomplished prior to the opening of fuel caps or valves. And regardless of popular opinion, clamping onto a tie-down rope doesn't do the job.

Hidden in an obscure section of the Petroleum Handling Operations for Aviation Fuels, TM 10-1107 is a reference to "no refueling within 300 feet of ground energized radar." Few people realize that this radar is powerful enough to pop flashbulbs. Just imagine what this might do to a concentration of gasoline vapors.

There is nothing quite so refreshing to some POL handling people as a little gasoline spillage on the hands or arms to cool off. The fast evaporation of the gas not only cools, but also will remove natural oils from the skin. This drying may lead to parched, scaly skin, rashes or other dermatitis. Aviation gasoline contains a relatively large amount of tetraethyl lead. This TEL may be breathed or absorbed into the body through the skin. Large amounts may cause dizziness, unconsciousness, or death.

The rapid advance of Army Aviation has greatly increased the burden of refueling operations. Aviation fuel handling is no longer a job for unit "eight balls," but requires trained people.

Fuel handling can be amazingly safe. Let's keep it that way. □


NEVER SMOKE NEAR AN AIRCRAFT OR FUEL TANKER (NO CLOSER THAN 50 FEET)
OF COURSE CIGARETTE LIGHTERS AND MATCHES ARE NEVER CARRIED!
THE ASHES ON THE GROUND MAY BE YOUR OWN!

PROGRAM YOUR WORK, WORK YOUR PROGRAM

Captain Harrell N. Gillis, TC

YEARS AGO, with the two-cub section, a particular aircraft was assigned to a mechanic for maintenance. In some instances one mechanic performed all the required work on that airplane. Standardization, present in some degree at time of manufacture, was a minor consideration. Modifications were performed to fit individual requirements, such as the rearrangement of flight instruments, changes in controls, etc. Aircraft maintenance methods have undergone a period of transition in the past few years.

The introduction of all-metal aircraft marked a turning point in Army aircraft maintenance. The number and complexity of the aircraft increased. Aviation companies came into being. A program of maintenance also came into being to meet the problems engendered by this increase in complexity and numbers of aircraft.

No longer could aircraft be flown "as necessary" and maintenance done "when conven-

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Capt Gillis is assigned to the Dept of Maintenance, USAAVNS, as supply officer. He is fixed wing rated and instrument qualified.

TABLE 1. PEACETIME ANNUAL ARMY AIRCRAFT FLYING HOUR FACTORS

ITEM	US CONARC ACTIVE	RESERVE	CLASS II	SCHOOL TRAINING WOLTERS	SCHOOL TRAINING RUCKER	NATIONAL GUARD
Airplanes						
L-19A	314	174	325	126	604	170
L-19E	382	235	329	382	440	206
TL-19D	379	--	342	318	328	210
AO-1	314	--	--	--	500	--
RL-23D	400	--	400	--	--	--
RL-26D	400	--	400	--	--	--
L-20A	427	--	451	558	630	281
L-23D	600	--	552	629	809	222
L-23E	569	--	527	--	--	--
L-23F	520	--	--	--	--	--
L-26B	461	--	--	--	--	--
L-26C	517	--	640	--	--	--
L-26D	548	--	439	--	--	--
U-1A	372	--	232	--	376	--
AC-1	360	--	--	--	--	--
Helicopters						
H-13D	104	--	32	--	98	--
H-13E	150	--	124	--	211	92
H-13G	137	--	200	--	128	139
H-13H	290	--	245	--	133	136
H-23B	64	--	19	--	--	85
H-23C	162	--	142	502	25	109
H-23D	250	--	619	713	108	180
H-19C	86	--	504	--	110	--
H-19D	191	--	229	--	238	--
HU-1A	240	--	240	--	475	--
H-21C	235	--	163	--	322	--
H-34A	234	--	218	--	446	--
H-37A	186	--	289	--	220	--
HC-1	300	--	--	--	--	--

ient." To schedule replacement parts, to provide an orderly flow of work into higher echelon maintenance facilities, a flying hour program was established.

Supply Bulletin 1-1, "Army Aircraft Flying Hour Factor," sets forth the peacetime and mobilization flying hour factors for each type, model, and series of aircraft. In short, the Department of Army plans backup logistical support for each type aircraft based on an annual flying hour program. (See table 1.)

The scheduled flying hour program is closely allied with timely aircraft maintenance. Untimely maintenance causes other aircraft to be "overflown" to meet required missions. This increases unscheduled maintenance (maintenance which cannot be predicted), creates maintenance backlogs, upsets the scheduled maintenance program, and in general causes a drop in overall aircraft availability.

Aircraft availability also varies as a result of climatic conditions; adequacy of facilities, tools, spare parts, supplies, and equipment; quantity and skill level of personnel (including supervisory and managerial type); and the grounding of aircraft for safety of flight measures. The introduction of new types and models of aircraft also increases maintenance downtime until experience is gained on the aircraft throughout its maintenance cycle.

Downtime for scheduled maintenance can be predetermined with reasonable accuracy (preflight, postflight, periodic, and special inspections). This scheduled maintenance program is designed to keep each aircraft in the air and out of the shop as much of the time as possible. It ensures that aircraft are in proper operating condition and detects and corrects conditions likely to cause trouble before they become serious.

Thorough and repetitive inspections are considered a backbone of routine aircraft maintenance. Irregular, haphazard, or perfunctory inspections result in gradual but certain deterioration of aircraft. The shop time which must eventually be spent in reconditioning aircraft thus abused totals far more than the time saved in hurrying through routine inspections. The objective of the inspection and maintenance system is to maintain the end item in a serviceable and operable condition.

Technical publications for each type of Army aircraft specify the interval at which the various required inspections will be accomplished, usually expressed in terms of aircraft flying hours or calendar days. It follows that the number of hours an aircraft is flown significantly affects the available time for that aircraft. The major responsibility for the safe operation of aviation equipment belongs to the using activity; therefore, using activities must be alert in inspection and replacement of equipment. The inspection intervals given in the technical publications are maximum; they should never be exceeded.

Maintenance scheduling is necessary for high standards and efficient flight scheduling. It becomes more important when experienced maintenance personnel or adequate facilities are limited. Administrative planning, if conducted properly, decidedly improves maintenance. It is often impossible for the maintenance officer to secure the desired number of trained and experienced personnel. By placing experienced personnel in key positions, the maintenance officer can fill in with on-the-job trainees until they become proficient. The output of completed aircraft largely depends upon the assignment of men to the positions for which they are best fitted.

Aircraft vary in simplicity or complexity of maintenance from the L-19 to the H-37 (see table 2). The L-19 is relatively easy to maintain, because it has been continuously improved over many years. On the other extreme is the very complex and expensive H-37. It has many unexpected deficiencies. Some parts wear out sooner than expected, and replacement parts are not immediately available for prestocking. Because of the 37's complexity and size, approximately 25 manhours of maintenance must be performed for each hour the aircraft flies, compared to approximately 5 manhours for the L-19. Flying time is thus drastically limited for the H-37.

The operations officer receives, schedules, and directs the execution of missions required by the supported headquarters and in accordance with the policies of the unit. Normally he will select the type of aircraft for the mission based upon availability of aircraft and conditions of landing site, weather, and economy. Specific types of aircraft should not be requested unless definitely needed.

The operations officer must schedule aircraft carefully to

TABLE 2. MAINTENANCE MANHOURS PER FLYING HOUR

TYPE AIRCRAFT	ORGANIZATIONAL MAINTENANCE	FIELD MAINTENANCE	TOTAL
L-19	3	2	5
L-20	4	3	7
L-23	4	4	8
U-1A	6	4	10
AC-1	10	2	12
AO-1	14	5	19
H-13	4	5	9
H-23	4	5	9
H-19	7	9	16
H-21	7	10	17
H-34	7	10	17
H-37	10	15	25
HU-1A	5	1.5	6.5

Tables 1 and 2 reflect the latest changes from the office of the Chief of Aircraft Maintenance, Fort Rucker Alabama. —Editor

obtain the average flying time needed each day. Mutual coordination between the operations officer and maintenance officer must be affected on a continual basis to provide the number of aircraft needed to meet mission requirements and simultaneously permit adequate time for maintenance.

The backbone of the maintenance section is its aircraft status board. This board reflects current operating data. Through the use of this data, the movement of aircraft is scheduled. It reflects major periodic inspections, aircraft status, aircraft hours, engine hours, time till next inspection, and a complete coverage of special equipment and related activities. Table 3 shows a sample board headings.

By inspecting his aircraft status board, the maintenance officer can foresee the probability of major inspections becoming due for two or more aircraft at or near the same time. When this occurs, he should coordinate flight scheduling with the operations officer to arrange major inspections on a staggered schedule. If this arrangement is inadequate and inspections become due at the same time, the maintenance officer must schedule the inspection of one aircraft before the actual time for the major inspection.

The maintenance officer is also responsible for the scheduling, as far in advance as possible, of spare parts, repair parts, and time change components. Careful scheduling will eliminate delays in receipt of major accessories and repair parts.

Aircraft are becoming more common in Army units as reorganization takes place. The commander of an Army unit having Army Aviation organic or attached to it exercises command over matters concerning the operation and use of Army Aviation within his command. This includes supervision of aircraft maintenance, flight operations, and tactical employment in accordance with appropriate Department of the Army regulations.

With the continual expansion of firepower and mobility in the Army, commanders are placing an increased demand on Army Aviation to provide the overall mobility and flexibility of our ground troops and equipment. To keep abreast of these increased demands, the Army is continuously developing and procuring greater numbers and types of aircraft, and forming aviation organizations at all levels of command which will meet the requirements of ground commanders. It is, therefore, vital that maintenance of Army aircraft be adequately programmed and the program followed by all concerned and that all personnel develop a sound logistical support program for efficient aircraft utilization. □

TABLE 3. AIRCRAFT STATUS BOARD HEADINGS

TYPE ACFT	ACFT SN	STATUS	ACFT HOURS	ENG HOURS	NEXT INSP	MAJOR PERIODIC	W/O NO.	REMARKS	BATTERY	COMPASS SWING	FIRST AID	GENERATOR	RADIO	SAFETY BELT

New Armament Branch Added by USAAB

Major John R. Ahern, Arty

THE EMPHASIS being placed on helicopter armament in military and industrial circles has brought about the creation of a new Armament Branch in the Test Division of the U. S. Army Aviation Board, Fort Rucker, Ala.

The branch monitors all helicopter armament development. Personnel includes six officers, supported by one TC and one Ordnance Corps liaison officer, a civilian armament specialist, and an enlisted armament repairman.

The mission of the Aviation Board Armament Branch is to

—monitor all armament developments and select available hardware for evaluation by the board;

—prepare Military Characteristics for the development of armament systems to fulfill Army requirements;

—plan for future board test projects;

—prepare plans of test;

—conduct tests of armament equipment;

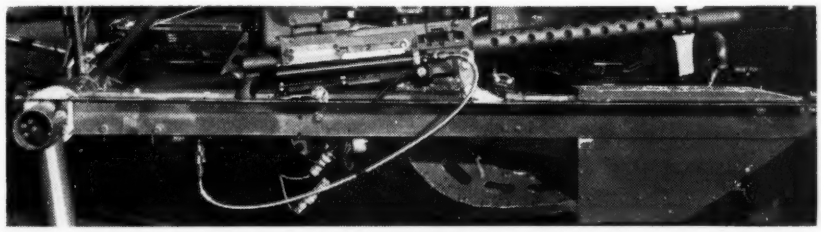
—review and prepare comments for engineering change proposals;

—monitor development and research relative to all armament hardware and systems.

A quick review of armed helicopter developments in the last few years might help our readers understand the need for such a branch.

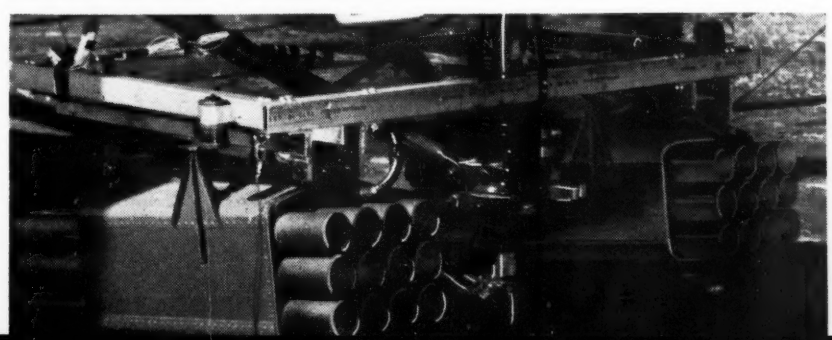
In 1956 the Aviation School was assigned a study project entitled "Armed Helicopter Mobile Task Forces." An outgrowth of these studies resulted in activating a unit called "Sky Cav Platoon." It was a reconnaissance type force completely mounted in armed helicopters. Today this organization is known as the 8305th Aerial Combat Reconnaissance Company (Experimental) and represents the latest thinking in organization and tactical employment of such a unit. The equipment used by this unit has many shortcomings. Helicopters are not optimum in performance, reliability, or ease of maintenance. The armament has been adapted to the helicopters by impromptu hand design, employing existing weapons largely designed for ground troops.

Until recently, there had been no approved requirement for arming helicopters, and no approved Military Characteristics. However, the ACR unit proved the feasibility of arming helicopters, and numerous demonstrations impressed upon the imagination of many high ranking officers and civilians the potential and capability available in the airmobile weapons platform. This effort is most commendable and will



The H-13 twin 30 caliber machinegun kit was developed at the Aviation School. It has been modified at Springfield Armory and is presently undergoing the final stages of engineer testing. The Armament Branch has recommended that this weapon system be type classified and put into production as soon as possible.

The Army recently evaluated the 2.75 inch rocket using the H-21 helicopter. The 2.75 was modified to spin upon launch. At 1,500 meters a 40-mil dispersion pattern was reduced to approximately 10 mils. Realizing the existing deficit in the rocket delivery capability today, the Army is directing its efforts toward a 2.75 inch rocket launcher system. Testing of this system was tentatively scheduled for September with the hope that an interim system can be sent to the field as soon as possible.



Maj Ahern is former Chief, Armament Branch, U. S. Army Aviation Board. He is a Senior Army Aviator with approximately 3,500 hours in both fixed and rotary wing aircraft and is instrument qualified.

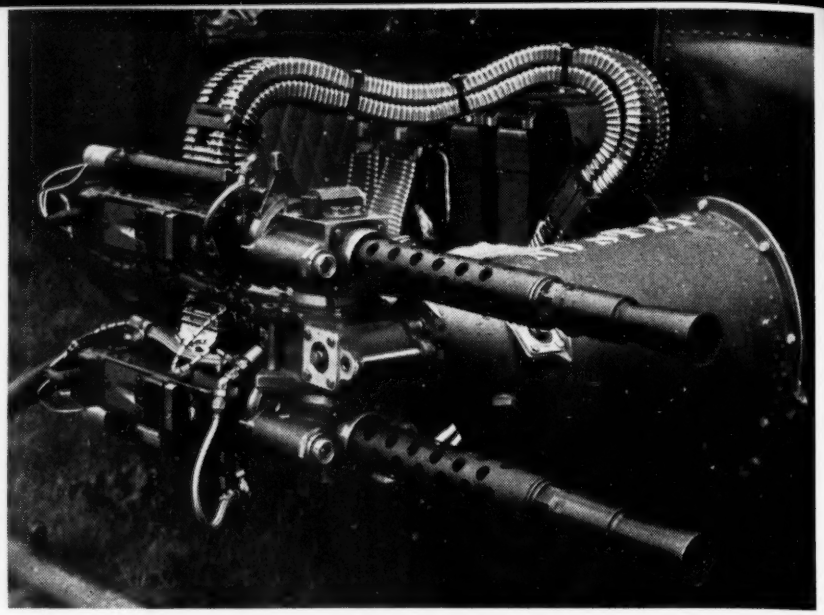
go down in Army Aviation history as being responsible for initiating the helicopter armament program.

On 16 May 1960, the first Qualitative Materiel Requirement for armed helicopter weapons systems was approved. By 12 January 1961 Military Characteristics were written by the Aviation Board which then placed these efforts in research and development channels. So actually, it has been but a relatively short time since the development of requirements and characteristics. This is why approved armament hardware is still not in the hands of troops. As of today, only three items of armament hardware have reached the Armament Branch of the Aviation Board for testing. These are the Townsend Machinegun Fire Suppression Kit, the SS-11 ATGM Missile, and the Mark XI, 20mm gun pod.

A problem common to all R&D programs plagues the helicopter armament development program, i.e., too much time is required in the development and testing cycles. When these time cycles are shortened the new Armament Branch of the Aviation Board will be able to expedite their user tests and earlier production will be realized.

Besides the new developments pictured in this article, the Armament Branch is engaged with the following projects:

The 4.5 inch rocket has been demonstrated at Fort Rucker and Fort Bragg, using the H-34 and H-21 as aerial platforms. Although there are good features about this rocket system, standardization and logistical implications will prevent further development.

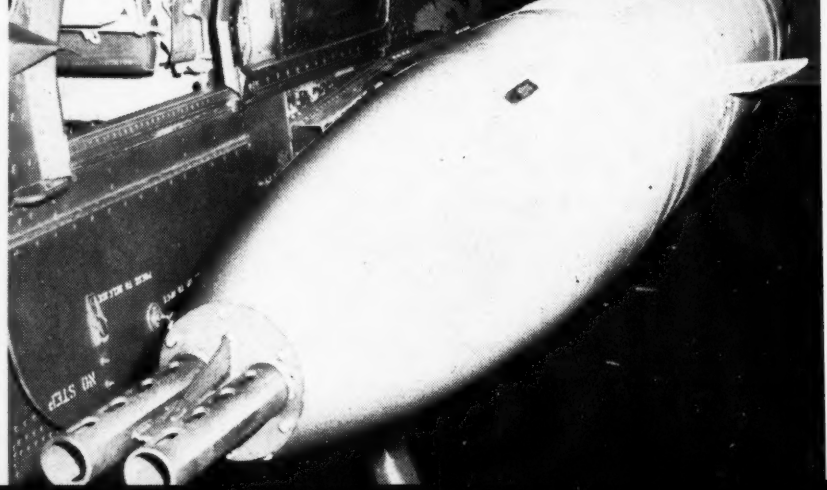


The Emerson fire suppression kit is shown mounted on the HU-1 helicopter. It employs four 7.62 M-73 machineguns, turret mounted and capable of 70° depression, 12° elevation, and 60° traverse. This weapons system is also being tested on an H-34 and H-21 and is presently undergoing engineer testing at Aberdeen Proving Grounds.

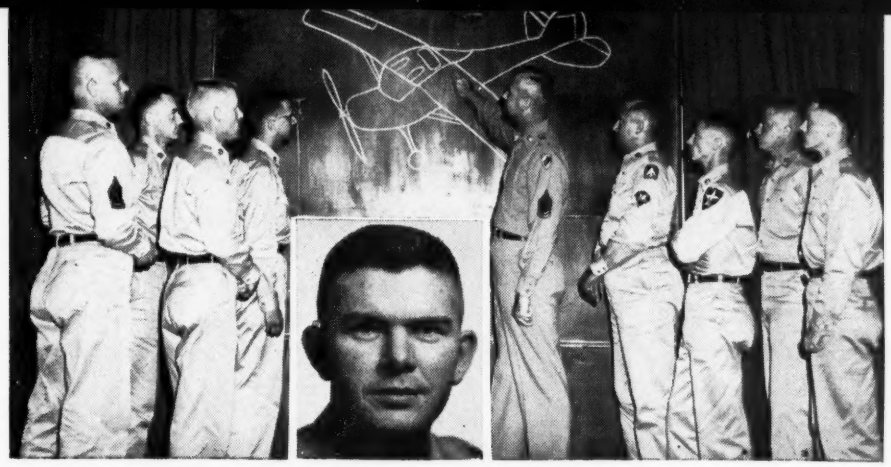
The XM-75 is a 40mm weapon mounted in the nose of the HU-1 helicopter. It is still under development and testing at Burlington, Vermont, under the direction of Springfield Armory. It is not contemplated that this weapons system will be available for user test until 1962.

A new project on the SS-11 wire guided missile system is presently underway which envisions a newly designed rocket suspension system mounted on an HU-1 helicopter employing a yaw dampener. This should be available in October of 1961 for confirmatory testing at the Aviation Board. □

MK XI 20mm gun pod mounted on one side of an H-34 was recently evaluated by the Aviation Board. It is a single gun, twin barrel weapon with a rate of fire of 4,200 rounds per minute and was employed using the MK VIII Sight. The results of this evaluation indicated that the high rates of fire are desirable and do not effect platform stability or create unusual sighting problems. The Marine Corps has also evaluated this pod and wish to jointly fund the development of a similar type pod. The gun pod holds 750 rounds of ammunition, weighs 1,200 pounds.



Flight Operations Specialist Course Underway at Rucker



The Army's need for a Flight Operations Specialist Course (MOS 907) was filled 16 August when the first class convened at the U. S. Army Aviation School, Fort Rucker, Ala.

This Army-wide course is similar to one previously conducted by the Airfield Command, Fort Rucker, to meet local needs. (See DIGEST, December 1960.)

The new course is designed to give enlisted personnel thorough training in academic and tactical subjects; aircraft characteristics; weather; basic navigation; radio navigation and publications; VFR and IFR operations; rules, regulations and procedures; and related functions pertaining to airfield operations.

The School has scheduled a total of eight 6-week courses and 94 students for FY 1962. Personnel desiring to attend must have at least 9 months active duty remaining upon completion of the course. They also must have a score of 100 or better on aptitude area GT, normal color perception, good near vision, normal use of both hands, clear speech, and normal auditory acuity. Further information can be obtained from DA Pamphlet 20-21, Army School Catalog Course No. 1-R-907.1.

The man whose initiative and foresight led to the establishment of the Flight Operations Specialist Course is M/Sgt Robert R. Young, Flight Operations Chief, Cairns AAF, Fort Rucker, Ala., (inset). For his outstanding contribution to Army Aviation he was named the Army Aviation Soldier of 1960 at the annual AAAA meeting.

Continued from page 20

Currently in preparation are the Aerial Gunnery Course and the HC-1 Chinook programs of instruction. The Aerial Gunnery Course will feature SS-11 firing from the HU-1B helicopter. The HC-1 course will propose a new approach aimed at future battlefield survival and mission accomplishment in all-weather conditions.

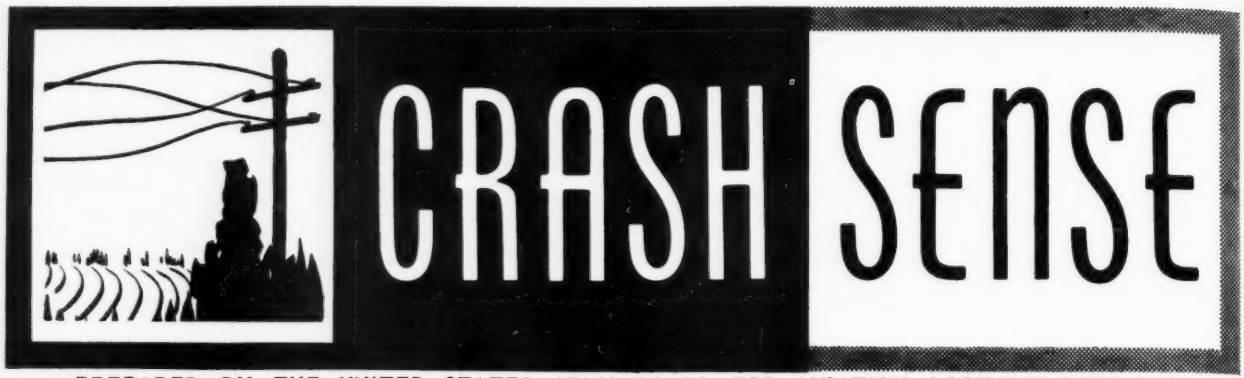
Instruction Division: The Artillery Committee is currently experimenting with techniques of adjusting artillery fire from helicopters. The purpose of this research is to support the proposals which have been made to integrate instruction of artillery fire adjustment into rotary wing programs of instruction.

The Employment and Field Exercise Branch has just completed teaching its fourth AO-1 Mohawk class. All classes have demonstrated a keen interest in the realistic training atmosphere. The training includes classroom presentation, tactical navigation, aerial photo missions, and a field exercise. Improvements in techniques are a continuous process.

The next AO-1 Class, 62-1, will have the AN/FPN-33 (GCA radar) ready to assist in day, night, and all-weather operations. It is anticipated that the AN/MPQ-29 tracking radar will soon be available for all-weather AO-1 aviator training.

The Branch is also integrating a pathfinder team and Army Air Traffic Regulation and Identification (AATRI) into its fixed-wing field exercise problem. The pathfinder team will "jump in" and set up a night landing airfield. The AATRI will be used as outlined in FM 1-60, "Army Aviation Air Traffic Operations, Tactical."

An operation of Flight Coordination Center (FCC) from a division aviation company airfield will be simulated during the conduct of the problem. This FCC will provide VFR regulation, identification, flight following, inflight assistance, and air warnings in the forward area (sub areas I and II) for approximately 30 aircraft flying tactical missions. It will also maintain a current plotting board on the location of all aircraft participating in the FEX. Thus, the fixed-wing student aviator will have an opportunity to participate in operations involving the pathfinder team and the AATRI system. □



PREPARED BY THE UNITED STATES ARMY BOARD FOR AVIATION ACCIDENT RESEARCH

WIRES!

7 NOVEMBER 1960—

1. IMMEDIATE ACTION IS REQUIRED ON THE FOLLOWING SAFETY OF FLIGHT ITEM:

2. DURING THE PERIOD 1 JANUARY 1960—30 SEPTEMBER 1960, THE ARMY EXPERIENCED FIVE FIXED WING AND 23 ROTARY WING WIRE STRIKE ACCIDENTS AND INCIDENTS. THESE RESULTED IN TWO PERMANENT INJURIES AND THREE TEMPORARY INJURIES. THESE ACCIDENTS COST APPROXIMATELY $300,000.

3. TWO FACTORS MUST BE APPRECIATED:

a. WIRES NORMALLY CANNOT BE SEEN FROM AN AIRCRAFT IN FLIGHT.

b. LOW - LEVEL TACTICAL FLYING REQUIRES ACCEPTANCE OF THE RISK OF HITTING WIRES.

4. EFFORTS MUST BE DIRECTED, HOWEVER, TO REDUCE WIRE COLLISION ACCIDENTS TO A MINIMUM COMMENSURATE WITH THE FULL ACCOMPLISH-

MENT OF THE AVIATION MISSION. SOME SUGGESTED AREAS FOR ATTENTION ARE:

a. TRAINING OF GROUND PERSONNEL IN KEEPING WIRES LOW OR AWAY FROM TACTICAL LANDING AREAS.

b. PRIOR GROUND RECONNAISSANCE OF ANTICIPATED LANDING AREAS.

c. CONFINEMENT OF LOW-LEVEL PRACTICE FLYING TO AREAS KNOWN TO BE CLEAR OF WIRES.

d. MAINTENANCE OF A NOTAM MAP OF THE LOCAL FLYING AREA WITH HAZARDOUS WIRES NOTED THEREON.

e. TRAINING OF FLIGHT PERSONNEL IN RECOGNIZING CLUES TO WIRES.

After the above DA TWX safety of flight message was sent out, wire strike accidents and incidents showed a dramatic drop. This continued through March 1961, proving what conscious recognition of the problem and concerted action can do.

But wire strike accidents are again on the rise. It's time to stop, take a hard look at the circumstances surrounding wire strike accidents, and redouble our efforts to prevent them.

Four of the most recent group of wire strikes happened during landing approaches, two during simulated bombing flights, two during hovering flight, one during a contour flight, and the other during a low reconnaissance. These are the phases of flight in which we must concentrate our preventive efforts. This is another way of saying that all phases of low-level flight are susceptible to wire strikes.

Let's take a look at two of the more serious recent accidents and see what can be learned from them. In both of these, the best descriptions of the accidents are given in the pilots' own words.

ACCIDENT NO. 1

"I prepared for the mission (flour bombing), and at approximately 1600 (hours) with my crewchief, SP4——— as passenger, I departed ——— Army Airfield for the location of the troops of the ——— Battalion. . . .

"I continued toward the location of the ——— Battalion, which was approximately one mile north of ———.

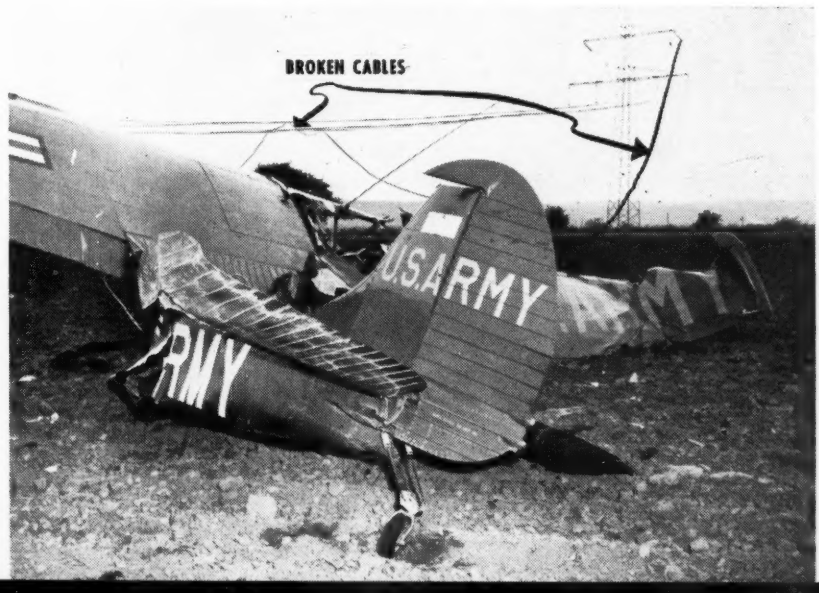
"I made a high recon of the area by flying from north to south. During the recon, I sighted a ¾ ton truck departing the wooded area in a southward direction and a group of approximately five personnel. I decided to 'attack' the vehicle as the first target.

"I flew over the road leading from the wooded area and over which the vehicle was traveling. As I flew along this route, I checked for obstructions to flight. I saw none that I considered would interfere with the mission. . . made a turning descent to the left. This turn was made from a heading of south to a heading of north. I leveled off at an altitude of what I considered to be approximately 200-250 feet above the ground.

"At the time I leveled off, I was approximately ⅛ mile north of the town of ———, left of the road on which the vehicle was traveling, and south of the wooded area in which the ——— Battalion was located. I looked ahead and saw no obstructions, then glanced at the road to see if I was in a position suitable for dropping the flour bombs. I looked forward again and saw that I was at the level of and approaching approximately four or five wires. I said something to my crewchief. However, I cannot recall exactly what I said due to the rapid sequence of events. I immediately added power and pulled back on the stick in an attempt to clear the wires. The response of the engine to the sudden application of throttle appeared normal.

"As the aircraft began to fly over the wires I heard a thump. I figured that my landing gear had caught in the wires. Following the thump was a flash of blue sparks and a crackling noise.

"I looked forward . . ."



"The next recollection of events was the impact of the aircraft on the ground. After the impact, I heard my crewchief say, 'Get out, get out, sir, there's gas!' I unfastened my safety belt and stood up, and then sat down again to turn off the switches. I recall turning off the magneto switch, and then decided to evacuate the aircraft as I became aware of the gasoline spilling on me from a ruptured gasoline tank. The gasoline was also pouring into the cockpit.

"I crawled out through the top of the aircraft, and ran over to where my crewchief was standing. He and a Sgt ——— of the ——— Battalion caught me and walked me to a safe distance from the aircraft. Sgt ——— and other personnel rendered first aid to myself and the crewchief. We were then evacuated to the hospital."

Thanks to the pilot's APH-5 helmet and their locked harnesses, both occupants escaped with minor injuries.

The wires in this case were high tension powerlines, strung between metal suspension towers (see photograph). These towers were approximately 150 feet high. Why weren't they seen?

The pilot of this aircraft, 6 months out of flying school, was relatively inexperienced. He had a total of 377 hours. The flight was his first simulated bombing mission since joining his new unit. Naturally, he was eager to make a good showing. This eagerness probably played a large part in causing him to go right into the bombing run without a thorough high reconnaissance.

ACCIDENT NO. 2

"My mission was to fly Chaplain ——— from ——— to ——— for services at 1045 hours on 11 June 1961.

"I took off from ——— on or about 0910 hours and flew to ———. I landed at ——— Army Airfield to drop off some official papers for the ——— Infantry. Prior to landing, I was informed by radio relay with another helicopter that Chaplain ——— was to be picked up in front of the chapel at ———.

"After leaving ——— Army Airfield, I flew to ———, picked up the chaplain and flew on to ———. Upon arrival at ———, the weather was broken, approximately 1,000 feet, with light rain.

"I made my approach to the west-southwest to the helipad I had set up on 9 June. At the termination of my approach, I decided to hover the chaplain over near a bridge which was only a couple of blocks from the church. I made this decision because the chaplain was supposed to speak at 1045 hours and the time was then 1040 hours.

"While hovering toward the bridge, I saw a telephone pole to my left front and a public address speaker to my right front. I decided to hover between the two, keeping the rotor blades higher than the public address speaker. Continuing to hover toward and between the pole and the speaker, I suddenly noticed a wire falling and realized I had clipped one with two other wires still extending. To keep from hitting the other wires, I pulled back on the cyclic and went downward on the pitch. In doing this, I must have overcorrected the cyclic to the left, because I saw that I was too close to the pole and in that instant hit it with the rotor blades. The helicopter

"I saw a telephone pole . . ."

went to the right and over on its right side, hitting the ground. I unstrapped myself and the chaplain, making sure he was not hurt. Neither of us were injured.

"During the entire hovering, I did not see the wires until I had hit them. I thought the only wires from the pole were extending to the left of the pole to a small tent. I could not see the wires I hit because it was darker than normal and, with the raindrops on the bubble, the wires blended into a hill mass in the background."

This accident proves that wire strikes are not limited to the inexperienced. This aviator had nearly 1,400 hours flying time.

The one thing these two aviators had in common is that both were in a hurry, one motivated by his eagerness to make a good showing and the other by his desire to deliver his passenger on time. Haste, we suspect, is common to many wire strike accidents. The aviator in a hurry does not have time for an adequate reconnaissance.

MORE ON PROJECT SCAN

Operational Memo #1, concerning responses to Project SCAN, was recently released by the Flight Safety Foundation. The information contained in this memo should be of interest to all aviators.

"Project SCAN has been in operation less than a month, and already several thousand near-collision reports have been received, some of them accounts of incidents of the past, and others detailing near-collisions that have occurred within the last 60 days. Analysis and data-processing of these reports is progressing.

"For safety's sake, may we suggest that attention be drawn to the cautions that analyzed near-collision reports of the past point up as essential. Pilots alert to the lapses in good operations which have resulted in near-collisions and who make certain they are not guilty of any of them will do much to eliminate the near-collision hazard.

"Following is one of the cautions indicated by past reports:

"ADHERE TO THE LANDING PATTERN!

"In considering near-collision incidents of the past, especially in the General Aviation (private flying) category, one of the primary causes of near-collisions has proved to be **pilot failure to adhere to established traffic patterns.**

For example,

"In some instances visiting pilots unfamiliar with local procedures, elect to make straight-in approaches rather than circle the airport to determine the flow of traffic. This puts them in conflict with aircraft adhering to the pattern, and creates a collision hazard.

"In other instances locally based pilots have created near-collision hazards by 'cutting corners' . . . by trying to slide in ahead of and even underneath pilots in the pattern, thus forcing sudden pull-ups and go-rounds to avert mortal contact.

"Still a third 'popular' fault rests with the gregarious pilot, the fellow who drops down from cruising altitude to cut across the airport just to take a closer look, possibly to see if he can spot a friend's airplane, to note who's operating the service facility, or merely to be nosey from his catbird seat! Very often this sociable type is so busy ogling something or other he fails to see the aircraft in the pattern he's ignoring, and the lives he's endangering, not the least of which is his own!

"To reduce the near-collision hazard, it is essential that pilots be cautioned or warned against failure to adhere to established landing patterns."

ICE

TWX Crash Facts Message—9 January 1961. H-23 was started at main heliport preparatory to routine training mission. A 20-minute ground runup was made. Helicopter brought to hover and moved toward takeoff point. While in hovering flight, at an approximate altitude of 3 feet, instructor reports hearing a loud noise followed immediately by a severe vibration of the main rotor system. Helicopter was immediately landed under power. Investigation revealed vibration was caused by ice formation within one main rotor blade. Main rotor blade tip assembly and mounting bracket damaged by ice breaking loose from blade.

TWX Crash Facts Message—9 January 1961. After takeoff, at an altitude of approximately 400 feet, H-23 instructor reported the helicopter developed sudden, severe vibration. Autorotation entered and aircraft was landed in open area. Inves-

tigation revealed vibration caused by ice formation within one tail rotor blade. Ice breaking loose, and rotation of blade at high velocity, resulted in snapping of rivets and wrinkling of blade trailing edge.

TWX Crash Facts Message—9 January 1961. After takeoff, at an altitude of approximately 400 feet, H-23 pilot reported helicopter began slight vibration. Climbing turn was begun and vibration became extreme. The pilot completed a 180° autorotation landing. Investigation revealed vibration was caused by ice formation within one tail rotor blade. Ice breaking loose, and rotation of blade at high velocity, resulted in snapping of rivets and wrinkling of blade trailing edge.

TWX Crash Facts Message—9 January 1961. H-23 instructor pilot reported helicopter began sudden, extreme vibration during level flight at an altitude of approximately 500 feet. The aircraft was autorotated to a landing on a paved road. Investigation revealed vibration caused by ice formation within one tail rotor blade. Ice breaking loose, and rotation of blade at high velocity, resulted in snapping of rivets and wrinkling of blade trailing edge.

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Six forced landings, all on the same day and all in the same location. It's a safe bet the pilots of these six aircraft are now ice-conscious. During the previous day, rain had collected in main and tail rotor blades through vent openings. Overnight, the temperature went below freezing, and ice was the result. This is October. Need we say more? □

IT COULD HAPPEN TO YOU

"I was on a test flight in an H-19C Chickasaw. The crewchief, riding in the left seat, and I were alone in the aircraft. The weather was clear and the aircraft performing beautifully. The crewchief seemed to be enjoying the flight.

"I climbed to an altitude of 4,000 feet and leveled off, then flared to zero airspeed. I made a pedal turn to the left, lowered pitch, then made a right pedal turn in quick succession.

"As I completed the pedal turn to the right, I looked across the cockpit and saw the crewchief's face turn deathly white. His shoulder harness was unlocked and he slumped forward, out cold. His head hit the cyclic and shoved it forward.

"I reached across with my left hand and managed to straighten the crewchief in his seat, freeing the cyclic.

"The aircraft was dropping rapidly, but each time I took my hand away from the crewchief to reach for the pitch, he would slump forward again and block the cyclic. I could not reach his shoulder harness lever to lock him upright because it was on the opposite side of the seat from me.

"In this fashion the aircraft descended 2,000 feet while I alternated between trying to hold him up and get to the pitch and power. Fortunately, at this point, the crewchief came to and sat up. I made sure his shoulder harness was locked and the rest of the flight was uneventful.

"What worries me about this incident is the fact that it could have happened at a much lower altitude with far more serious results.

"I believe the cure for this can be effected through an engineering change to locate shoulder harness locks in all side-by-side aircraft cockpits on the inside of the seats, where the locks will be available from pilot or copilot positions."

Our thanks to the anonymous donor of this account. Though perhaps an isolated case, this condition could easily cause a serious accident. It's something for all of us to think about.
—Editor

Needless to say, things aren't "A-OK" at the airfield depicted on our cover. How many unsafe practices can you count? Who's committing them? Some S T U P I D JERK? Unfortunately, no. These things happen all the time, to people like you and me—people who KNOW BETTER.

Ever wonder WHY such unreasonable (a n d sometimes downright implausible) h a p penings occur? Maybe the four IMPs are responsible — IMPatience, IMProvising, IMPulsiveness, and IMPunity.

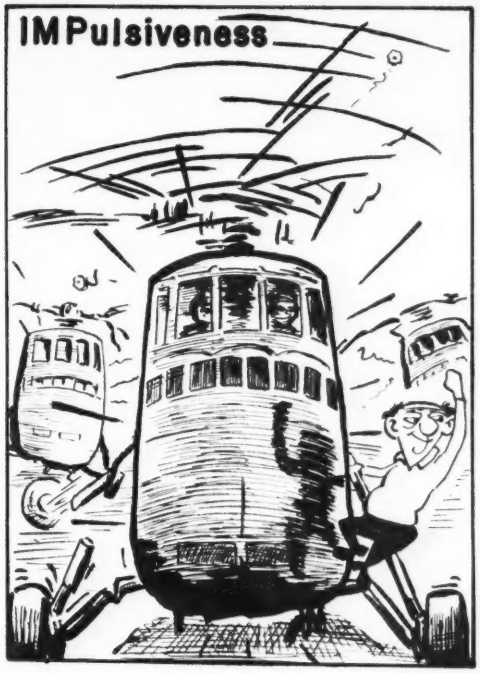
Beware Of The IMPS!

Let's look over the dossier on each of these IMPs.

IMPULSIVENESS. This little fellow makes you jump and do something before you can even think about it! He operates closely with impatience. He can be overcome by the simple step of thinking before acting. Watch out for him; he's a real tricky character!

IMPROVISING. The trouble with this little monster is that sometimes under the right circumstances he's a true blue helper. Unfortunately, he has no brains of his own. YOU must decide when and where to use him. A field expedient is fine—when the proper tools or equipment aren't available and the job must be done. But when they are available, use them. And never improvise when it presents an unsafe operating condition!

IMPATIENCE. This IMP is a real nagger, and works well with the other IMPs. Working alone or with the help of the others he causes unwise decisions. A deadly little fellow to watch for!



IMPUNITY. This little guy is always whispering in your ear, "It can't happen to YOU . . ." If you let him, he'll soon lead you to believe it always happens to the other guy and that you can do no wrong. Remember, if it can happen to anyone else, it can happen to you!

Look over your airfield operation. Some of the operational hazards we've shown may not be so farfetched after all. You may even see some to add to the collection.

ARMY
ARMY
EVERY MONTH IS